Preliminary Assessment

Crawford Street Site
Portland, Oregon

Prepared for
Crawford Street Corporation

June 14, 2000

BRIDGEWATER GROUP, INC.

CONTENTS

Text

INTRODUCTION 1

1 1 Purpose of the Preliminary Assessment 1
1.2 Scope of Preliminary Assessment 2

CURRENT SITE CONDITIONS AND OPERATIONS 3

2 1 Local Utilities and Storm Water System 3
2.2 North Area 4
2.3 South Area 8
2 4 Adjacent North of Crawford Street Corporation Property 9
2.5 Adjacent East (Upriver) of Crawford Street Corporation Property 10
2.6 Adjacent West (Downriver) of Crawford Street Corporation Property 11

SITE HISTORY 12

3.1 South Area 12
3 2 North Area 17
3 3 Adjacent North of Crawford Street Corporation Property 21
3 4 Adjacent East (Upriver) of Crawford Street Corporation Property 22
3 5 Adjacent West (Downriver) of Crawford Street Corporation Property 23

POTENTIAL EXPOSURE PATHWAY SETTING 25

4 1 Groundwater Pathway Exposure Setting 25
4.2 Surface Water Pathway Exposure Setting 26
4.3 Direct Contact and Air Exposure Pathway 27

ASSESSMENT OF POTENTIAL SOURCES AND MIGRATION PATHWAYS .. 28

5.1 Former Underground Storage Tanks 28
5 2 Runoff From Columbia Forge Yard 30
5.3 Black Sand Import Fill 32
5.4 Historical Industrial Operations 35

SAMPLING AND ANALYSIS OF SOURCE/PATHWAYS OF CONCERN 38

6.1 Storm Water Runoff From Columbia Forge Yard 38
6.2 Import Black Sand 40
6 3 Contingent Groundwater Migration Pathway Assessment 42
6 4 Sampling Procedures 43
6.5 Analytical Laboratory Analysis 46
6.6 Data Quality Objectives 48
6.7 Reporting 48

Tables

Table 5-1	Former Underground Storage Tanks on CSC Site
Table 6-1	Proposed Columbia Forge Surface Water Pathway Surface Soil Sample Locations

Figures

Figure 1-1	Site Location Map
Figure 2-1	Site Plan
Figure 2-2	USGS Topographic Map
Figure 2-3	1998 Aerial Photograph
Figure 2-4	Columbia Forge Site Plan
Figure 2-5	Shoreline Features
Figure 3-1	Sanborn Map and 1988 Emcon Study Features
Figure 6-1	Proposed PA Sampling Locations

Appendices

Appendix A	Photographs of Current Site Conditions
Appendix B	Representative Material Data Sheets
Appendix C	Sanborn Fire Insurance Maps
Appendix D	April 4, 1988, Sweet Edwards/Emcon report for Proposed Manufacturing Management Inc. Site, (Lampros Steel)
Appendix E	Analytical Laboratory Report for Underground Storage Tank Removal Soil Samples
Appendix F	Exploration Locations on Property East of the CSC Site
Appendix G	Figure 2 from July 20, 1989 Sweet-Edwards/Emcon report

SECTION 1

INTRODUCTION

This Preliminary Assessment (PA) report presents the results of a PA performed for the Crawford Street Corporation (CSC) site in Portland, Oregon (Figure 1-1). The CSC site includes current addresses of 8424 and 8524 North Crawford Street. This PA is being performed under an Oregon Department of Environmental Quality (DEQ) Voluntary Cleanup Letter Agreement dated November 8, 1999.

DEQ has presumed that releases may have occurred on the CSC site and that releases may have migrated to the Willamette River based on 1997 Willamette River sediment sampling performed by EPA. In particular, DEQ developed an October 1, 1999 Site Strategy Recommendation presenting a summary of the known site conditions and results of the offshore sediment sampling.

The DEQ Site Strategy Recommendation noted that the following contaminants were detected in the river sediments offshore from the CSC site at concentrations greater than "baseline" conditions:

- Arsenic
- Lead
- Mercury
- Di-n-butylphthalate
- Low molecular weight polynuclear aromatic hydrocarbons (LPAHs)
- High molecular weight polynuclear aromatic hydrocarbons (HPAHs)
- Organotins

DEQ used the presence of these elevated concentrations in the near-by sediments as a basis to presume that releases of these, and other, hazardous substances have occurred on the CSC site. Based on this presumption, and as discussed in the Site Strategy Recommendation, DEQ requested that CSC perform a PA including soil and groundwater sampling.

1.1 Purpose of the Preliminary Assessment

The purpose of the PA is to assess the potential for releases of hazardous substances to have occurred at the CSC site and for the releases, if they have occurred, to pose a threat to human health or the environment. Based on DEQ's presumed connection between the CSC site and the near-by Willamette River, the PA was focused toward whether releases, if any, on the CSC site could potentially pose a threat

to potential receptors at the CSC site, including those associated with the Willamette River.

1.2 Scope of Preliminary Assessment

The PA was performed by reviewing available historical information, performing a site reconnaissance, and interviewing available persons familiar with the current and past site operations. Specific sources of information reviewed included:

- Sanborn Fire Insurance maps from 1905, 1911, 1924, 1950, and 1969.
- Aerial photographs from the U.S. Army Corps of Engineering and Northern Lights Studio from 1936, 1939, 1940, 1948, 1955, 1956, 1957, 1961, 1963, 1964, 1967, 1968, 1970, 1971, 1972, 1973, 1977, 1980, 1984, 1991, 1994, 1996, and 1998.
- City Directories for 1936, 1941, 1950, 1955, 1960, 1970, 1975, 1980, 1985, 1990, and 1998.
- Historical photographs from the Oregon Historical Society for the late 1800s, early 1900s, and 1932.

A site reconnaissance was performed on December 9 and 21, 1999. Representatives of CSC and the current property tenants were interviewed during the site visits.

SECTION 2

CURRENT SITE CONDITIONS AND OPERATIONS

The CSC site is an approximately 15-acre site located along the Willamette River in the St. Johns district of Portland, Oregon (Figure 2-1). The CSC site is situated in the southwest quarter of Section 15, Township 1 South, Range 1 West. The CSC site is bordered by the Willamette River to the south, North Burlington and North Richmond Streets to the west and east, respectively, and by North Crawford Street to the north. A Union Pacific Railroad (UPRR) rail spur runs east/west through the center of the CSC site.

For the purposes of the PA and consistent with the past and current use of the site, the CSC site is separated into two areas; North Area and South Area. The North Area is located north of the railroad tracks and the South Area is located south of the railroad tracks. The North Area is currently mostly covered with buildings and pavement while the south area is vacant and covered with gravel and asphalt pavement.

The overall CSC site area slopes down, relatively steeply north of the CSC site, from north to south with a slight slope down from east to west. A USGS Map showing the regional topography is presented in Figure 2-2. A 1998 aerial photograph is presented in Figure 2-3. Appendix A presents representative photographs of the current site conditions.

2.1 Local Utilities and Storm Water System

The CSC site is currently served by the public utility system including water and sewer. Water lines are located beneath North Crawford Street and the UPRR rail spur. Electric power is provided from along North Crawford Street. A buried, 8-inch diameter UPRR diesel pipeline is located beneath North Crawford Street west of the CSC site and between North Burlington and North Richmond Streets. The pipeline alignment then follows North Richmond Street between North Crawford Street and the UPRR rail spur. East of the CSC site, the pipeline lies beneath the UPRR rail spur.

Storm water runoff in the CSC site area is collected in local catch basins and conveyed in the City of Portland storm sewer system. The collected storm water is conveyed to the Willamette River through the outfall located west of the St. Johns Bridge (City Outfall 52). Prior to 1997, storm water runoff from the CSC site was discharged through the outfall located on the City of Portland property west (downriver) of the CSC site (City Outfall 50). From the early 1900s to about 1997, sewage overflows from the St. Johns area were occasionally also conveyed through Outfall 50 during periods of wet weather. Starting in 1997, sewage overflows from

the St. Johns area were diverted to Outfall 52 and are no longer discharged through Outfall 50.

Storm drain lines at the CSC site are located along the UPRR rail spur and along North Crawford Street. Catch basins along Crawford Street drain into the Crawford Street lines. Roof drains from the CSC buildings are connected to the line along the UPRR tracks. Two catch basins are located just north of the intersection of the UPRR tracks and North Burlington Street. These catch basins capture most of the runoff from both the CSC site and the large area up-slope (i.e. north) of the CSC site. The buried storm drain lines flow east to west.

2.2 North Area

For the purposes of describing the current site conditions and consistent with current site use, the north area is subdivided into four subareas:

- North Richmond Street to North Charleston Street (Vacated)
- North Charleston Street (Vacated) to North John Street (Vacated)
- Columbia Forge
- Lampros Steel

The current site conditions on each of these areas are presented below.

2.2.1 North Richmond Street to North Charleston Street

This area is vacant and covered mostly with dense vegetation. This area slopes down from the northeast to the southwest. A portion of the interior of the area has been cleared and gravel fill has been placed. Lampros Steel is using the gravel-filled area for limited storage of structural steel product.

The entire area is fenced with a gate in the southeast corner of the area. No significant areas of stains or distressed vegetation were observed in this area. In summary, no evidence of releases of hazardous substances was observed in this area of the CSC site.

2.2.2 North Charleston Street to North John Street

This entire area is covered by a 200-foot by 200-foot steel building. The building is open to the west and is used by Lampros Steel to cut structural steel beams. The building has a sound concrete floor and no floor drains were observed. Lampros uses small quantities of lubricating oil in a beam saw located near the center of this building. Lampros uses water-based cutting lubricants in the beam saw. The lubricating oil and water-based cutting oils were stored in various locations in the building, near the cutting equipment. The oils are added to the equipment as necessary to maintain cutting lubrication. Representative Material Data Safety Sheets (MSDSs) of cutting oil are presented in Appendix B.

Oil staining was observed on the building floor beneath the cutting equipment. The oil was contained on the floor and no evidence of release to the underlying soil was observed. Lampros representatives noted that they have always used water-based lubricants since they started operations at the CSC site in 1989.

Used oil from the Lampros facility is accumulated in the Columbia Forge area (See Section 2.2.3) and recycled off site. Cleaning solvents are not used to wipe down the equipment.

In summary, no evidence of releases of hazardous substances was observed in this area of the CSC site.

2.2.3 Columbia Forge

The Columbia Forge area includes a 10,000 square-foot steel building on the eastern edge of the area (Building 1) and a 20,000 square-foot concrete masonry and wood-frame building on the western edge of the area (Building 2/3). The buildings border an approximately 26,000 square-foot operations yard that includes covered upset forges, shear, drop forge, and induction heater areas and an oil storage shed. These buildings are shown in Figure 2-4.

Two forges set on concrete pads are located in the southern end of Building 1. The perimeter of this area is covered with a concrete floor with the area between the forge pads and the perimeter being bare ground. The floor and ground surface in this area is covered with mill scale which is oxidized metal that falls from the surface of the steel after it has been heated and is being shaped. The mill scale is a valuable product and is routinely collected from the floor and reprocessed. The forges are fueled by natural gas. The forges are cooled with water that is circulated through a water cooling-tower outside the southeast corner of the building.

The northern portion of Building 1 is used for machining and contains several large lathes. This area has a sound concrete floor with no floor drains. Water-based cutting oils were observed in this area and the CSC representatives noted that the facility had been using water-based oil since the late 1970s. Prior to that time, petroleum-based cutting oils were used. No evidence of releases was observed in the machining room.

The far northern end of Building 1 is used for offices.

Columbia Forge Building 2/3 is used primarily for storage of various metal equipment, parts, and steel stock. Steel cutting is performed in the southeastern corner of this building. Oil stains are present on the building floor. This building has a sound concrete floor and no floor drains. Two small part washers are located in this building as shown on Figure 2-4. Petroleum-based naphtha solvents have been used since Columbia Forge started operations. Chlorinated solvents have never been used at the Columbia Forge facility. Columbia Forge is a conditionally exempt hazardous waste generator due solely to the waste naphtha solvents (i.e. D001) generated in the Safety Kleen part washers. Safety Kleen maintains the parts washers and removes spent naphtha solvent for

recycling at least quarterly. Safety Kleen has been providing these services for at least 13 years. Waste oil and waste solvent are not mixed.

Small quantities of oil and lubricant products were observed in this area including lubricant oil for the air compressor located just east of the building and aerosol cans of brake cleaner in the northwest portion of the building. No evidence of releases of these products was observed in these areas.

The Columbia Forge yard is an approximately 26,000 square-foot area between Building 1 and Building 2/3. The yard is paved except for the far southwest portion. Upsetter forges and induction heaters are located in covered areas along the eastern edge of the yard. A large drop forge is located in a covered area in the southern portion of the yard. Welding operations are performed in a covered area in the southeastern portion of the yard. All forging and general operation areas are covered. Steel materials to be forged are stored throughout the yard including steel rod and pipe.

A compressed air tank and a drop forge muffler vessel are located in the southwest portion of the operations yard. These tanks are located on concrete pads. Apparent oil staining was observed on the concrete pads and the unpaved ground surface adjacent to these features.

An approximately 1,000 square-foot oil storage building is located in the central portion of the yard. Lubricating oil used in the equipment on the Columbia Forge site is stored in this building. Other materials stored in this building include used oil, and two drums of Safety-Kleen naphtha solvent. Approximately forty 55-gallon drums, mostly lubricating oils, were stored in the oil storage building. The drums were placed in metal containment trays and spill kits were conspicuously located in the northeast corner of the building. The floor of the building was sound concrete with no floor drains. Although there was evidence of incidental drippage of oil (i.e. stains) on the building floor, rapid cleanup of the incidental drippage with absorbent material appears to have prevented any migration of the minor spills. The facility manager did not recall any spills of oil that caused impacts outside the building. Representative MSDSs of the products stored in the building and used in the Columbia Forge area are presented in Appendix B.

An electrical transformer is located on a 5-foot by 5-foot concrete pad in southwest portion of the Columbia Forge operations yard. There was no staining on the exterior of the transformer or the concrete pad or any other evidence of leakage from the transformer.

Used oil is removed from the Columbia Forge site by a licensed oil recycler for recycling. Lampros Steel provides its used oil to Columbia Forge for recycling. Columbia Forge recycles the used oil offsite at a licensed oil recycling facility. Used oil has been recycled offsite since prior to the mid 1980s. Currently, Columbia Forge uses Oil Re-Refining Company and Spencer Environmental for the offsite recycling of used oil. Based on the MSDS information for the oil products and generator knowledge, the used oil is not a hazardous waste.

Two storm water drainage catch basins are located in the yard. One catch basin is located near the northeast corner of the drop forge. One catch basin is located along the western edge of the yard just north of the compressor building. Storm water runoff from the yard flows to these catch basins. From the catch basins, the water flows through buried pipes to the south boundary of the yard where the water enters a recently installed sand filter/retention box. After flowing through the sand filter/retention box, the water exits the box and infiltrates into the ground alongside the UPRR rail spur.

Prior to the recent construction of the sand filter/retention box, the water would directly exit the drain pipes and infiltrate into the ground surface near the UPRR rail spur (as shown in the photographs in Appendix A, taken during the site reconnaissance, before the sand filter/retention box was installed). Soil staining was observed at the outlets of the two drain pipes along the UPRR spur during the December 1999 site reconnaissance.

CSC has installed filters within the catch basins to remove suspended particulates from the storm water runoff. The filters and sand filter/retention box were installed as part of Crawford Street's continuing review and implementation of Best Management Practices that has been performed over the past several years.

Most of the roof drains from the Columbia Forge and Lampros buildings are connected directly to the storm drain line located along the UPRR rail spur.

At the time of the initial site reconnaissance in December 1999, Columbia Forge leased a small (less than 2,000 square-feet) space in the northern end of Building 2/3 to TLS Steel. TLS performed light metal heating, shaping, punching, cutting, and bending using a small natural gas-fired furnace. TLS had been operating in the current location since 1989. The portion of Building 2/3 that TLS occupied is a wood frame building with a metal roof.

TLS used small amounts of lubricating oil and cutting oil at the various metal fabricating machines locations in their limited space. All cutting oils were water-based. Lubricating and cutting oils were stored in various containers throughout the relatively small TLS area. All cutting oils and lubricating oils were obtained from Columbia Forge. Although petroleum stains were present on the TLS floor, the floor was sound concrete with no floor drains. No evidence of recent releases of hazardous substances was observed in the TLS area.

Used oil from the TLS operations was accumulated at the Columbia Forge area and recycled off site.

TLS vacated the space in May 2000. The space is currently vacant.

2.2.4 Lampros Steel

Lampros Steel has been operating on the CSC site since 1989. Lampros Steel distributes steel structural members (typically steel W and H

sections). As part of the distribution work, Lampros also cuts and bends members to customer specifications. All cutting and bending work is performed in the building located west of the Columbia Forge area (See Section 2.2.2).

Activities performed in the Lampros area in the northwest corner of the CSC site include general storage of equipment and raw materials (steel bars and beams). Hazardous substances observed in the Lampros building included hydraulic oil (three 55-gallon drums), water-based cutting oil (two 55-gallon drums), and used oil (one 55-gallon drum). No significant stains were observed on the sound concrete floor. No floor drains were observed. Representative MSDSs of products used at the Lampros Steel facility are included in Appendix B. The Lampros Steel office is located in the northwest corner of the Lampros building.

A 1,000-gallon, above ground diesel storage tank is located at the northern edge of the Lampros site. A steel containment box surrounds the tank. No stains were observed on the pavement surrounding the containment box. The Lampros representative was not aware of any releases or spills from the tank.

Lampros Steel is not a registered hazardous waste generator and evidence of hazardous waste generation was not observed. Used oil generated through equipment maintenance is placed in the Columbia Forge oil storage building and recycled offsite by a licensed oil recycler.

In summary, no evidence of recent releases of hazardous substances was observed in this area of the CSC site.

2.2.5 UPRR Rail Spur

Soil staining typical of rail road operations was observed along the UPRR rail spur separating the North and South Areas. The staining was consistent with petroleum hydrocarbons releases from diesel locomotives and spillage of products from the rail road cars.

2.3 South Area

The South Area of the CSC site consists of about 7 acres of open area used by Lampros Steel to store and stage structural steel beams. Most of the northern half of the area is paved with asphalt. Most of the southern half is covered with gravel. Lampros Steel representatives estimated that about 60 percent of the overall South Area is paved. No buildings are present in this area and the structural steel is stored in rows with access paths for the fork lifts and trucks in between the rows.

The entire South Area is fenced with access gates in the western and eastern ends of the area. The fence has been knocked over for an approximate 100-foot length along the southern edge of the property near the abandoned extension of North John Street and for an approximate 50-foot length along the eastern boundary near the UPRR rail spur. Lampros is currently repairing the perimeter fence.

The riverbank is vegetated with blackberries and small trees. Most of the bank is covered with concrete debris and logs. Some of the concrete debris is larger than 6 feet with logs greater than 20 feet long. Smaller asphalt debris was also observed on the riverbank. Although the vegetation limited the ability to closely observe, no seeps were observed along the riverbank during the site reconnaissance. A nominal 8-inch diameter concrete pipe was observed protruding from the riverbank about 200 feet east of the western boundary of the CSC site. No evidence of recent flow from the pipe was observed (even after recent wet weather) and the pipe appeared to be associated with previous uses of the CSC site.

An approximate 8-inch diameter steel pipe daylights at the river bank near the eastern edge of the CSC site. No flow was observed coming from the pipe at the time of the site visit (after recent wet weather).

In general, surface water was observed to infiltrate into the bare ground in the South Area and no evidence of direct surface water runoff to the adjacent Willamette River was observed. However, there were limited areas along the riverbank where small draws and associated surface water collection areas along the top of the bank were observed. Although these areas do not appear to drain large areas of the South Area, localized runoff collection and flow to the adjacent river could occur in these areas during heavy rainfall events.

Limited areas of black sand were observed along the top of the bank and, in some areas, along the river shoreline. The black sand appears to be different from the native soil present along the riverbank. The black sand was present in some of the small draw areas observed along the riverbank. The black sand is believed to have been imported and placed by previous property owners during the demolition of the former lumber mill buildings.

In summary, no evidence of recent releases of hazardous substances was observed in this area of the CSC site.

2.4 Adjacent North of Crawford Street Corporation Property

The area north of the CSC site is used for heavy equipment and truck storage and repair. St. Johns Truck and Equipment/Hildebrand Truck & Equipment is located immediately north (up gradient) of the CSC site, across North Crawford Street at 8435 North Crawford Street. The central portion of the St. Johns Truck and Equipment site is used to store a large amount of disassembled truck parts including transmissions, wheels, tires, tanks, rear-end assemblies, and axles on unpaved ground. The property was observed from public right-of-ways during the site reconnaissance.

A heavily stained, uncovered wash pit is present immediately adjacent to North Crawford Street, across the street from the Columbia Forge office.

The approximate 15-foot by 30-foot area drains to a sump that presumably drains to the local storm water or sanitary sewer system. The concrete floor in the wash pit was heavily stained with petroleum hydrocarbons. What appeared to be a solvent cleaning tank was also located in the wash pit. Any releases from the solvent tank would also flow directly to the drain.

Based on hazardous substance reports filed with the State Fire Marshal, St. Johns Truck and Equipment handles significant quantities of hazardous substances including waste oil, motor fuel, fuel oil, and welding gasses. St. Johns Truck and Equipment is also noted as having a sodium hydroxide cleaning tank.

The western portion of this up gradient property (across from Lampros Steel offices) is also used to store trucks. Oil stains are present on the unpaved ground where the trucks are stored. Torch cutting of disassembled truck parts is also being performed in this area.

St. Johns Marine is located north of the CSC site, along North Richmond Street. Along with boat and boat motor repair facilities, boats and boat motors are stored outside on unpaved ground.

Storm water runoff from these up gradient areas flows on to, and across the CSC site. In particular, runoff flows off of the St. Johns Truck and Equipment site and flows on to the Lampros Steel property at the west end of the CSC site, onto the Columbia Forge yard, and onto the Columbia Forge and Lampros Steel yard at North John Street. A sheen was observed on this runoff during the site visit. CSC constructed an asphalt berm along the southern edge of North Crawford Street to reduce the amount of runoff coming on to the CSC site from up gradient properties.

The runoff from the up gradient properties continues across the CSC property to the UPRR rail spur where it ponds and infiltrates. During heavy rainfall events, this runoff from the up gradient properties can flow to the west to the City of Portland catch basin at the intersection of North Burlington Street and the UPRR rail spur.

Storm water runoff also flows down North Richmond Street to the UPRR rail spur from the up gradient properties.

2.5 Adjacent East (Upriver) of Crawford Street Corporation Property

The property east (upriver) of the North Area of the CSC site consists of a residence and an auto repair shop. The shop is located in an approximately 80-foot by 30-foot building. Vehicles and small construction equipment were observed on the unpaved area around the building.

The property east (upriver) of the South Area is presently vacant. Various debris are present on this property including concrete debris, tires, and general trash. Vegetation on this adjacent property consists of grasses,

blackberries, and small trees. Recent petroleum staining was observed along the UPRR rail spur immediately east of the CSC site.

2.6 Adjacent West (Downriver) of Crawford Street Corporation Property

The property west (downriver) of the Northern Area of the CSC site is vacant and used to store steel sheets. This area is not paved.

The property west (downriver) of the Southern Area of the CSC site is the location of the City of Portland Bureau of Environmental Services (BES) laboratory. This area is mostly paved with some landscaped areas. Storm water runoff in the eastern portion of this area is directed to a small ditch and wetland area in the eastern area of the BES property. A waste pile containing asphalt debris was observed on the eastern edge of the BES property, adjacent to the CSC property. The Willamette riverbank also contains concrete and asphalt debris at the eastern edge of the BES property.

SECTION 3

SITE HISTORY

This section summarizes the history of the CSC site and the immediate surrounding properties. The site history is based on the review of the Sanborn Fire Insurance maps, the historical aerial photographs, and the City Directories. Some recent site use information was obtained through the interviews with CSC and CSC tenant representatives. Copies of the Sanborn Maps are provided in Appendix C and relevant features noted on the Sanborn Maps are shown on Figure 3-1.

The overall history of the CSC site area includes both residential and industrial use. The CSC site's close proximity to the St. Johns neighborhood and the Willamette River has resulted in both residential and industrial land uses around the area. Land use at, and adjacent to, the CSC site is industrial.

The St. Johns district of Portland is one of the oldest districts in Portland with development dating back to the 1800s. The area, including the CSC site, has been serviced by public water since the early 1900s. No wells are known to have been present on the CSC site and historical facilities used water pumped from the Willamette River to supplement the local water supply system.

3.1 South Area

As noted in Section 2, the South Area is the portion of the CSC site located between the UPRR railroad spur and the Willamette River. The location of the streets (existing and vacant) used to reference the subareas discussed below are shown on Figure 2-1.

Numerous large log rafts were present along the entire CSC river front, offshore of the CSC site, from the early 1900s to the mid-1970s, all prior to CSC's ownership of the property. No other significant water front activities appear to have occurred. No shipbuilding or ship repair was performed. The limited length of riverfront where a dock was located (see 3.1.1 below) was used only for staging of sand and gravel.

3.1.1 North Richmond Street to North John Street

3.1.1.1 Activities Prior to CSC Ownership

The earliest available Sanborn Map (1905) shows a closed small lumber mill (Central Lumber Company) along the shore in the western portion of this subarea. The mill extends out into the river on a dock. No fuel tanks are on the map and the map notes that a sawdust-fueled electrical generator powered the mill. The mill was apparently closed in 1904 due to

"litigation" and this area was generally vacant by 1911. The 1911 Sanborn map also notes a "Horse Barn" and "Wagon Shed" in this area.

A dock was constructed at the end of North Richmond Street sometime between 1911 and 1924. The dock was used solely to stage sand and gravel. There is no evidence that ship building or repair was performed at, or around, the dock, or anywhere else on the CSC site. The dock was removed between the late 1940s and 1950s.

From sometime between 1911 and 1924 to 1973, this area was used for a variety of manufacturing and warehouse activities. American Marine Iron Works (foundry and machine shop) was noted in this area on the 1924 Sanborn Map. A "coke" storage area was also noted suggesting that the foundry was fueled by coke.

From the early 1930s to the 1960s, this area was used by Plylock Corporation (plywood mill) whose main portion of their operation was located east of the CSC site. The 1950 Sanborn Map shows a 20,000 SF "Woolen Mill" warehouse in the western portion of this area. The 1969 Sanborn Map shows a "Western Homes" operation on the eastern edge of this area. All of these facilities were noted as using "sawdust" for fuel and no fuel tanks are shown on the Sanborn Maps or apparent on the historical aerial photographs.

Buildings present in this area were demolished starting in the early 1970s. The City of Portland, through the Portland Development Commission, purchased the property in 1979. The last building was removed sometime between 1980 and 1984.

3.1.1.2 Activities During CSC Ownership

Manufacturing Management Incorporated (MMI) purchased this property from the City of Portland in 1988. MMI shortly thereafter transferred the property to the Crawford Street Corporation. In 1989, Lampros Steel started using this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.1.2 North John Street to North Leavitt Street

3.1.2.1 Activities Prior to CSC Ownership

The earliest Sanborn Map (1905) shows dwellings across most of this area with a small machine shop in the southwest corner. Starting sometime between 1905 and 1911, this area was used to store lumber for the St. John's Lumber Company. This area was used solely to store lumber until the mid-1950s. An April 27, 1924 fire damaged much of the lumber storage area but the area was repaired and the lumber storage continued.

Starting in 1955 to sometime between 1973 and 1977, 12,000 square-foot building was located in the southern portion of this area. The building was

associated with the Portland Lumber Company mill and was apparently used to store lumber. The building was demolished and the area was vacant from sometime between 1973 and 1977 to 1989. The City of Portland, through the Portland Development Commission, purchased the property in 1979.

3.1.2.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland in 1988. MMI shortly thereafter transferred the property to the Crawford Street Corporation. In 1989, Lampros Steel started using this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.1.3 North Leavitt Street to North Burlington

3.1.3.1 Activities Prior to CSC Ownership

Historical photographs obtained from the Oregon Historical Society notes this area being undeveloped, except for a few dwellings, in the late 1800s.

The earliest available Sanborn Map (1905) notes this area being used for lumber storage for St. John's Lumber Company. The 1911 Sanborn Map continues to note lumber storage with the addition of a 30,000 square-foot planing mill building and a 55,000-gallon water tower. The water tower was located at the end of the present-day, North Burlington Street and was present until 1969. The planing mill building was significantly reduced in size between 1911 and the 1930s. In the early 1950s, the planing mill was significantly expanded and was present until the mid-1970s.

An April 27, 1924 fire damaged much of the lumber storage platforms along the southern edge of this area.

By 1936, a 10,000 square-foot lumber storage building was located in the northern portion of this area. This building was expanded in the early 1950s and was present until the mid-1970s.

The Sanborn Maps note that mill refuse was used for fuel at the lumber mill and no oil tanks are noted on the maps. No oil storage areas are noted on the Sanborn Maps.

The 1969 Sanborn Map shows a small machine shop along the river from in the western portion of this area. The machine shop was apparently associated with the lumber mill and was removed with the other buildings on this portion of the CSC site in the mid-1970s. By the late 1970s, the site was vacant and all buildings had been removed. The City of Portland, through the Portland Development Commission, purchased the property in 1979.

Some former and current property tenants and representatives noted that black sand material was imported to the South Area and used for surface

fill when the lumber mill buildings were demolished. The reports of black sand fill are consistent with the black sand observed along the riverbank during the site reconnaissance (Section 2.3).

3.1.3.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland in 1988. MMI shortly thereafter transferred this property to the Crawford Street Corporation. In 1989, Lampros Steel started using this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site other than those possibly associated with the black sand.

3.1.4 Previous Environmental Investigation on South Area

In 1988, prior to MMI's purchase of the South Area, MMI retained Sweet-Edwards/Emcon to perform an environmental investigation of the South Area. The investigation included the following:

- Historical review including Sanborn Fire Insurance Map review and an interview with an unnamed, former onsite worker.
- Water sampling from pipes protruding from ground surface.
- Geophysical survey for subsurface features (e.g. underground storage tanks).
- Five test pits to assess subsurface features suggested from the geophysical survey.
- Removal of an underground storage tank identified from the geophysical survey and test pits in the east portion of the South Area.
- Sampling of black sand fill.
- Seven test pits and one soil boring to assess subsurface conditions in the area of the black sand fill in the western portion of the South Area.
- One soil boring exploration to assess a possible septic drain and drain field area in the east portion of the South Area.
- Soil and groundwater sample laboratory analysis for petroleum hydrocarbons, volatile organic compounds, PCBs, and EP Tox metals.

Figure 3-1 shows the approximate location of the Sweet-Edwards/Emcon key investigations and identified features.

The study identified and assessed the following possible environmental issues on the South Area of the CSC site:

- Up to about 6 feet of black sand fill is present in the western portion of the South Area along portions of the bank above the Willamette River shoreline. Based on an interview with a former site employee, the fill was reportedly placed during the demolition of the sawmill in 1977-1978, prior to CSC's ownership of the property. The sand was reportedly spent sandblast material that had been used to clean oil tanks. The sand was oily when placed and oily water reportedly migrated briefly to the adjacent river.

- EP Tox metal concentrations in samples of the black sand did not exceed hazardous waste levels. A sample of the material was measured to contain oil and grease at a concentration of 400 mg/kg. PCBs were not detected in a sample of the black sand material. Xylene was the only VOC detected in the black sand sample (0.31 mg/kg). Halogenated VOCs were not detected in the black sand sample. Perched groundwater with a sheen was observed in some of the test pits in the black sand area.

- Two groundwater samples (T-2/W-1, T-2/W-2) from near the black sand fill area were analyzed for nitrate, Total Organic Carbon (TOC), and Total Halogenated Organics (TOX). Nitrate was detected at concentrations of 0.14 and 0.1 mg/L in the two samples. TOC was detected at concentrations of 25 mg/L and 56 mg/L. TOX was detected at concentrations of 11.5 mg/L and 13.8 mg/L in the two groundwater samples. According to Sweet-Edwards/Emcon, the groundwater samples did not note any evidence of contamination. Soil beneath the black sand, but above the shallow groundwater, was not stained and did not indicate evidence of contamination. The shallow groundwater was about 26 feet beneath the bottom of the fill material.

- A soil sample collected from the test pits in the area of the former septic tank and drain field was analyzed for oil and grease, TOX, and VOCs. Neither oil and grease (detection limit of 100 mg/kg), TOX (detection limit of 2 mg/kg), nor VOCs were detected in the soil sample. According to the former site employee, the septic system reportedly served the former "Fibron" building located in the northeast corner of the South Area. Fibron was reported to have sold fiberglass insulation. Prior uses would have been associated with a plywood warehouse.

- A groundwater sample (T-1) was collected from the soil boring in the area of the former septic tank and drain field and analyzed for nitrate, Total Organic Carbon (TOC), and Total Halogenated Organics (TOX). Nitrate was detected at a concentration of 2.4 mg/L in the sample. TOC was detected at a concentration of 2 mg/L. TOX was not detected at a detection limit of 5 mg/L in the groundwater sample. According to Sweet-Edwards/Emcon, the groundwater sample did not note any evidence of contamination.

- The underground storage tank identified from the geophysical survey and a test pit exploration (TP-2) was located in the southeastern

portion of the South Area. A sample of the contents of the tank was found to be diesel. The tank was removed and properly disposed offsite. No field evidence of contamination was observed during the tank removal. Two soil samples collected from the bottom of the tank excavation and a third sample from the fill port area were analyzed for oil and grease. Oil and grease was detected in the bottom soil samples at concentrations of 100 mg/kg and 200 mg/kg. Oil and grease was detected in the soil sample from the fill port area at a concentration of 100 mg/kg.

- A reconnaissance of the river bluff did not note any groundwater seeps in the exposed bank.

A copy of the April 4, 1988 Sweet-Edwards/Emcon report is attached as Appendix D. Figure 3-1 shows the inferred location of the black sand based on the Sweet-Edwards/Emcon investigation and consistent with the black sand observed during the site reconnaissance.

3.2 North Area

As noted in Section 2, the North Area is the portion of the CSC site located between the UPRR railroad spur and North Crawford Street. The location of the streets used to reference the subareas discussed below are shown on Figure 2-1.

3.2.1 North Richmond Street to North Charleston Street

3.2.1.1 Activities Prior to CSC Ownership

The earliest available Sanborn Map (1905) shows only a few dwellings and a small machine shop in this area.

By 1911, a 9,000 square-foot machine shop with a foundry was located in this area. Based on the Sanborn Map, the foundry in the machine shop was fueled by coal. Two dwellings are also noted in this area on the 1911 Sanborn Map. The 9,000 square-foot building is vacant and only the dwellings remain in the 1924 Sanborn Map.

From the mid 1930s to 1948, this area was used for lumber storage. This portion of the CSC site was no longer used for lumber storage from about 1950 to the early 1970s when logs were stored in this area.

The building was removed in 1973 and, by 1977, this portion of the CSC site was not used and was vacant with vegetation.

3.2.1.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland Development Commission in 1988. MMI shortly thereafter transferred this portion of the CSC site to the Crawford Street Corporation. In the mid-1990s, Lampros Steel started using the middle of this area to store structural steel.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.2.2 North Charleston Street to North John Street

3.2.2.1 Activities Prior to CSC Ownership

From before 1905 to the mid-1930s, only dwellings were present in this area. Starting in the mid-1930s to the mid-1940s, this area was used to store lumber. The 1950 Sanborn Map shows a small auto repair shop (noted in the City Directory as Love Fuel Company) and a single dwelling on this area. No fuel tanks are shown to be associated with this facility.

Sometime between 1957 and 1960, a 200-foot by 200-foot building was constructed, covering almost this entire area. The 1969 Sanborn Map notes the building being used by Portland Manufacturing Company to store lumber.

The City of Portland Development Commission (PDC) acquired the property in the 1970s. Based on CSC representatives, the building was mostly vacant and used only for minor storage while the City of Portland owned the property.

3.2.2.2 Activities During CSC Ownership

MMI purchased this property from the City of Portland Development Commission in 1988. MMI file information notes that there was a drum of Silvex in the PDC building when the building was purchased by MMI in 1988.

This building is currently present on this portion of the CSC site and has been used by Lampros Steel since 1989. Shortly after purchasing the property, MMI transferred the property to the Crawford Street Corporation.

There are no records or direct evidence of releases of hazardous substances on this portion of the CSC site.

3.2.3 North John Street to North Leavitt Street

The earliest available Sanborn Map (1905) shows this area vacant. This area remained vacant except for periodic use for storage of plywood and lumber mill wood waste, until the mid-1950s when a 1,700 square-foot "Pattern Shop" was constructed in the northern portion of this area. The pattern shop is noted as "Peninsula Pattern Works" in the 1960 through 1970 City directories.

By 1961, the use of the western area of this portion of the CSC site, including "Pattern Shop" appeared to be associated with Skookum Logging Equipment, located to the west of this area. The use of the eastern portion of this area was associated with the 200-foot by 200-foot building located to the east.

Columbia Forge moved into the Pattern Shop building in 1971. The building was expanded in 1972 to what is currently the Columbia Forge office and Building 1. The current oil storage building was also constructed in 1972.

CSC files indicate that two underground storage tanks (USTs) were formerly present in this portion of the CSC site. Both tanks were removed in 1987. The approximate former locations of the tanks are shown on Figure 2-4.

One tank was located near the southern portion of the area in the "weld shop." This tank was a 1,000-gallon steel tank and was installed in the late 1960s. The tank was used to store Bunker C oil. A second tank was located along the northern edge of this area and was referred to as the "Yard" tank. This tank was a 1,000-gallon steel tank and was installed in the mid-1950s. This tank was used to store gasoline.

Soil samples were collected from the tank excavations and analyzed for petroleum hydrocarbons when the tanks were removed. The sample from the "Yard" UST was also analyzed for total lead and EP Toxicity lead. Diesel was not detected in either of the soil samples and gasoline petroleum hydrocarbons were detected only in the sample from the Yard UST excavation at a concentration of 16 mg/kg. The measured total lead concentration in the soil sample from the Yard UST was in the range of typical background concentrations and lead was not detected in the EP toxicity analysis. The laboratory report for the soil chemical analyses is presented in Appendix E.

A very small quantity (2 to 3 ounces) of PCB-containing oil was spilled inside an electrical induction heater cabinet in May 1987. The entire cabinet was removed from the CSC site and disposed properly by General Electric. No PCB oil was released outside the cabinet and no PCBs were released to the ground. There is no potential for the contained spill of PCB oil to have caused an impact to the Willamette River water or sediments.

In 1997, BES collected a storm water sample from the western drain pipe outlet from the Columbia Forge yard area (see Section 2.2.3 and Figure 2-4). The sample was analyzed for metals. Low concentrations of copper (10 µg/L), selenium (47 µg/L), and zinc (65 µg/L) were detected in the sample. Lead, cadmium, and chromium were not detected in the storm water sample.

3.2.4 North Leavitt Street to North Burlington Street

The earliest available Sanborn Map (1905) notes five dwellings on this area of the CSC site. The dwellings are also present on the 1911 map along with a building labeled "Portland Collapsible Box" on the southeast corner of this area. A "Lauther's Mercantile Warehouse" is also shown on the southwest corner of this area on the 1911 Sanborn Map.

By 1924, Skookum Logging Equipment Company began operations on this entire area except for the northwest corner of the area where three dwellings were located. The Skookum operations included a machine

shop in the southeast corner and a coal bin in the southern portion of the area. The Skookum facility also included a brass foundry in the northern portion of this area. Warehouses used to store hay and wire cable were noted in the southwest portion of this area in the 1924 Sanborn Map.

The Skookum facility was expanded sometime between 1940 and 1948 when the last remaining dwellings in this area were removed. The warehouses in the southwest portion of this area were removed in the late 1940s.

In 1950, Skookum Logging Equipment occupied the entire eastern half of this area. The Skookum operations had been expanded to include a blacksmith foundry with two furnaces, a hammer forge, and a machine shop in the southeast corner. No above ground or underground storage tanks or oil storage areas are noted on the Sanborn Maps.

The 1950 Sanborn Map shows Portland Chain Manufacturing Company occupying the western half of this area. The Portland Chain Manufacturing Company was mostly an open yard with five forge furnaces. A 3,500 square-foot building was located in the northwest corner of this area. Based on the Sanborn Map, the foundry furnaces were fueled by coke. No above-ground or underground storage tanks or oil storage areas were noted on the Sanborn Maps.

The buildings on the eastern half of this area were expanded in the period 1950 to 1955 such that the entire eastern half of this area was covered. Between 1963 and 1964, the building currently existing on the western portion of this area was constructed.

CSC files indicate that an UST was formerly present in this portion of the CSC site. The UST was removed in 1987. The approximate former location of the tank is shown on Figure 2-4. This tank was a 5,000-gallon steel tank and was used to store diesel. It is not clear when the tank was installed but it appears to have been installed before 1960. A soil sample was collected from the tank excavation and analyzed for petroleum hydrocarbons when the tank was removed. Gasoline or diesel was not detected in the soil sample. The laboratory report for the soil chemical analyses is presented in Appendix E.

3.2.5 Previous Environmental Investigation on North Area

The environmental investigation performed by Sweet-Edwards/Emcon in 1988 and described in Section 3.1.4 also included a historical review and site reconnaissance of the North Area. No soil or groundwater samples were collected in the North Area as part of the 1988 investigation.

The 1988 historical review and site reconnaissance noted the following:

- An 8-inch, buried, Union Pacific Railroad diesel pipeline is present beneath North Crawford Street.
- Three underground storage tanks had been previously located on the Columbia Forge and Lampros Steel areas. The tanks were removed in 1987. Petroleum hydrocarbons were detected at a concentration of

16 mg/kg in one sample. Petroleum hydrocarbons were not detected in the other two soil samples.

- Oily runoff of storm water has been noted to occur from the Columbia Forge and Lampros Steel areas. The runoff pooled along the UPRR rail road spur along the southern edge of the Columbia Forge and Lampros Steel areas.
- A fuel pump island and, presumably, an underground storage tank are present on the St. Johns Truck and Equipment property north of North Crawford Street. An outside steam cleaning area with a drain was also observed on the St. Johns Truck and Equipment property.

The Sweet-Edwards/Emcon report did not recognize the flow of storm water onto and across the CSC site from the properties up gradient (i.e. north) of the CSC site.

3.3 Adjacent North of Crawford Street Corporation Property

From before the earliest Sanborn Map available (1905) to the mid 1950s, the area north of the CSC site was mostly vacant with a few dwellings. Starting in the 1920's, the far west end was also used for lumber storage.

In the early 1960s, a building was constructed along the north side of North Crawford Street, between North John and Leavitt Streets. The building was used initially for a fuel business (St. Johns Fuel Company) and then for truck repair (Hildebrand Truck and Equipment starting between 1970 and 1975). The truck repair shop is still operated on this area north of the CSC site. Since its construction, more and more debris, equipment, and trucks have been placed around the truck repair building.

The property between North Burlington and Leavitt Streets was used for lumber storage up to the late 1960s. From that time to the present, this area has been used for auto and truck parking.

By 1991, a large amount of debris, equipment, and trucks in varying degrees of disassembly were present on almost all of the properties north of the CSC site. As discussed in other sections of this PA report, storm water runoff from these areas flows to, and across, the CSC site. Sheens have been observed on this runoff coming from the properties north of the CSC site.

A fuel pump was present on the St. Johns Truck and Equipment site in the late 1980s. Such a pump would have most likely been associated with underground storage tanks. DEQ has no records of USTs on the St. Johns Truck and Equipment site. However, City of Portland Fire Bureau records note a 2,000-gallon diesel tank and two 8,000-gallon gasoline tanks being installed on the St. Johns Truck and Equipment site. No files were found at DEQ or the Fire Bureau indicating that the tanks have been removed.

3.4 Adjacent East (Upriver) of Crawford Street Corporation Property

3.4.1 General History

The earliest available Sanborn Map for this area (1911) shows a dock along the riverfront, east of the CSC site. By 1924, the area east (upriver) of the CSC site was the location of a large plywood mill. The plywood mill was present in this area through the late 1960s. Plylock operated the mill from no later than 1950 to its closure.

The several Sanborn Maps covering this area over this period note glue storage areas. Phenol-based glue was a typical industrial product used at similar operations. The glue was presumably used to attach the wood veneers to form the plywood. Other hazardous substances typically associated with plywood mills include petroleum hydrocarbons from lubricating oils.

By the late 1960s, the plywood mill was abandoned and only a small cabinet shop remained operating in the area east (up river) of the CSC site. The plywood mill buildings and the dock along the river front were demolished in 1971 and 1972. By 1973, the area east of the CSC site was vacant with bare ground.

The property east of the CSC site is currently owned by the Metropolitan Regional Center (Metro) who recently purchased the property from the City of Portland.

3.4.2 Previous Environmental Investigation on Property East (Upriver) of Crawford Street Site

In 1988 and 1989, Sweet-Edwards/Emcon was retained by Grayco Resources to perform a Level I environmental site assessment and field investigation of the property east (up river) of the CSC site and south of the UPRR rail tracks. The investigation consisted of an historical review, a site reconnaissance, geophysical survey, 13 test pits, four hand auger borings, and 19 soil borings. Chemical analysis was performed on 25 soil samples and 22 groundwater samples. PCBs were detected in groundwater samples from soil borings on the western end of the investigation area, near the east end of the CSC site.

In 1994, the City of Portland retained Century West Engineering Corporation to perform a Phase I and Phase II environmental site assessment of the property east of the CSC site, north of UPRR rail tracks, and south of vacated North Bradford Street. The investigation consisted of an historical review, a site reconnaissance, and excavation of 12 test pits. No soil or groundwater samples were collected for chemical analysis from the test pits. The investigation did not note any evidence of contamination on the property.

In 1995 Emcon was retained by Metro to perform additional soil, groundwater, and sediment sampling on the property east of the CSC site and south of the UPRR rail tracks. Soil samples were collected from a series of soil borings and groundwater monitoring wells. Samples from the western end of the property (near the east end of the CSC property), noted PAHs in soil, groundwater, and sediment.

Figures showing the locations of the 1988, 1989, and 1995 explorations on the property east of the CSC site are attached in Appendix F. Almost all of the explorations are located at great distance (greater than 1,000 feet) from the CSC site. There are two soil borings and one test pit that are located within 200 feet of the CSC site (SE/E-13, SE/E-19, and TP-2). Laboratory data summary tables and boring/test pit logs for these explorations are also provided in Appendix F.

3.5 Adjacent West (Downriver) of Crawford Street Corporation Property

3.5.1 General Site History

The earliest available Sanborn Map for this area (1911) shows a dock along the riverfront, west of the CSC site. By 1911, the area west (downriver) of the CSC site was the location of a large lumber mill. The lumber mill operations included a large dock. The major operations of the lumber mill were present on this area through the mid-1950s. From the mid-1950s to its closure in the mid-1970s, this area was used for lumber storage and mill refuse management. The dock was present and used from the early 1900s to when the mill was demolished in the late 1970s.

St. Johns Lumber operated the mill until between the late 1920s and the early 1930s. From this period to its closure in the mid-1970s, the mill was operated by Portland Lumber Mills. The mill produced wooden boxes.

The mill operations included mill refuse handling and burning. Lumber mill operations also typically include use of lubricants and oils.

The property west of the CSC site was purchased by the City of Portland Development Commission (i.e. City of Portland) in the late 1970s when the former lumber mill and box manufacturer ceased operations on the property.

3.5.2 Previous Environmental Investigation on Property West of Crawford Street Site

In 1988, CSC considered purchasing the property west (downriver) of the CSC site from the City of Portland Development Commission (PDC). As part of their consideration of the property, CSC retained Sweet-Edwards/Emcon to assess potential soil and groundwater contamination issues on the property. The investigation noted several soil and groundwater contamination issues on the PDC property including:

- Over 500 cubic yards of black fill material containing petroleum hydrocarbons in the western portion of the property.
- Uncontrolled fill containing demolition waste and trash in the southern portion of the property.
- 2,4-dichlorophenol in shallow groundwater.

The file information also indicates that underground storage tanks associated with the former lumber mill were formerly present immediately north (upgradient) of the City of Portland property.

Appendix G presents a figure showing the inferred location of the black sand on the property west of the CSC site, based on the 1989 Emcon study.

In 1994, the City of Portland Bureau of Environmental Services (BES) retained RZA Agra to perform an environmental site investigation at the property west of the CSC South Area property. The investigation included:

- Site history review
- Twenty test pit excavations
- Drilling and construction of five groundwater monitoring wells
- Five test trenches

Samples of black sand material encountered in the test trenches were measured to have petroleum hydrocarbon concentrations up to 667 mg/kg. One sample of the black sand was analyzed for PCBs and TCLP metals. A PCB concentration of 0.24 mg/kg was detected in the sample and none of the TCLP concentrations exceeded the hazardous waste designation level. VOCs were not detected in a sample of the black sand. About 1,446 cubic yards of black sand material was removed from the property based on visual criteria.

Pentachlorophenol was detected in a groundwater sample from a well in the southwestern corner of the property at a concentration of 18 µg/L. This location is about 800 feet west of the CSC site.

In October 1994, a drilling contractor penetrated an abandoned electrical conduit filled with PCB insulating oil on the eastern portion of the City of Portland property. A series of test pits were performed and about 150 cubic yards of PCB contaminated soil was excavated. Five of the 15 confirmation soil samples collected from the excavation after the soil excavation was completed had PCB concentrations greater than 1 mg/kg.

SECTION 4

POTENTIAL EXPOSURE PATHWAY SETTING

This section describes the potential exposure conditions in the CSC site area through the groundwater, surface water, direct contact, and inhalation exposure pathways.

4.1 Groundwater Pathway Exposure Setting

4.1.1 Regional and Local Geology and Hydrology

The CSC site is located along the historical flood terrace of the Willamette River. As a result, river deposits of varying energy underlain by the sand and gravel Troutdale formation dominate the regional geology. The Troutdale formation is about 100 feet below the ground surface. Fill has also been historically placed along the river on top of the natural river deposits. Regionally, shallow groundwater is present within the river deposits. More productive groundwater zones are present within the underlying sand and gravel Troutdale formation.

Based on soil and groundwater investigations on the southern portion of the CSC site and the properties to the east (Metro/Willamette Cove) and west (City of Portland BES Laboratory) of the CSC site, near surface soil conditions at the CSC site are anticipated to consist of fine sand, silty fine sand, and clayey silt. The depth to shallow groundwater corresponds roughly to the elevation of the Willamette River and is about 30 feet below the ground surface at the CSC site. Debris, including brick and wood was encountered in the upper 10 feet on the CSC site and on the BES property west of the CSC site. "Manmade" fill was observed to depths up to 6 feet in test pits and borings along the western end of the CSC site on the bluff above the Willamette River shoreline. The fill consisted primarily of black, angular sand.

Based on the regional topography, the shallow groundwater is anticipated to flow toward the Willamette River and discharge into the river.

The average annual precipitation for the Portland area is about 40 inches.

4.1.2 Groundwater Use and Possible Exposure Pathway

There is no reported groundwater use on and around the CSC site. A preliminary search of the Oregon Water Resources Department did not note any groundwater supply wells within ½ mile of the CSC site. The area around the CSC site has been serviced by the public water system since the early 1900s.

Because of the relatively low hydraulic conductivity of the subsurface soil in the CSC site area, shallow groundwater wells would not likely produce

significant quantities of groundwater. Notwithstanding the expected low production from the shallow groundwater zone, near-by presence of the Willamette River would make it difficult to obtain the necessary permits to extract water from the shallow groundwater at the CSC site. Therefore, it is not reasonably likely that the shallow groundwater will be used for drinking water, irrigation, or industrial water supply.

Given this lack of direct use of the shallow groundwater and the anticipated discharge of the shallow groundwater to the adjacent Willamette River, discharge of the shallow groundwater to the river is anticipated to be the only beneficial use of the shallow groundwater. Any threat to human health or the environment posed through possible presence of contaminants in the shallow groundwater would be through this pathway.

4.2 Surface Water Pathway Exposure Setting

The primary surface water body in the CSC site area is the Willamette River, located adjacent south of the CSC site. Other than a man-made pond constructed on the City of Portland BES property west (downriver) of the CSC site, no other significant surface waters are present in the CSC site area.

The CSC site is located in an industrial area and much of the ground surface is paved or covered with gravel. The soil on unpaved areas consists generally of sand and silty, fine sand. The 2-year, 24-hour rainfall in the Portland area is about 2.4 inches (BES July 1999 Stormwater Management Manual). Storm water in the CSC site area either infiltrates into the ground or is collected in catch basins and conveyed in the local storm water system. The local storm water system drains to the Willamette River at either City Outfall 50 or 52.

The CSC site lies above the 100-year Willamette river flood plain. The 1996 flood did not exceed the top of the bank along the CSC site. The slope of the CSC site area is generally towards the south.

Because there is no other significant surface water body in the CSC site area and all storm water runoff flows to the Willamette River, migration of any COIs to the river is the sole surface water exposure pathway. The potential exposure receptors associated with the Willamette River are presented in the DEQ Site Strategy Recommendation. These possible receptors include:

- Persons participating in recreational boating, swimming, and beach use.
- Persons participating in recreational and subsistence fishing.
- Habitat and migration pathway for fish including Chinook salmon and steelhead, which are listed as threatened species under the Federal Endangered Species Act.
- Benthic community in the river sediments.

- Habitat for birds and wildlife.

4.3 Direct Contact and Air Exposure Pathway

The CSC site is located in a mostly industrial area with some surrounding residential and commercial uses. The nearest residence is about 100 feet away at the northeast corner of the intersection of North Richmond and Crawford Streets. No schools or playgrounds are located within ¼ mile of the CSC site. Cathedral Park is located about 1,000 feet west of the CSC site.

Except for the vacant property in the northeast corner of the CSC site and the shoreline, the CSC site is generally either paved or fenced or both. The shoreline is steep and covered with debris making access difficult from either the river or the upland property. As a result, the only potential direct contact and air exposure pathways are associated with worker contact with contaminated soil.

Because most of the ground is covered with buildings or pavement and use of the CSC site does not involve excavation work, there is little potential for incidental occupational worker exposure through direct contact. Indoor workers could possibly be exposed to volatile contaminants through infiltration of the contaminants from the soil into the overlying building interiors. Utility trench workers could possibly be exposed through direct contact and inhalation if utility trench excavations are performed in contaminated soil.

SECTION 5

ASSESSMENT OF POTENTIAL SOURCES AND MIGRATION PATHWAYS

This section presents the assessment of potential contaminant sources and associated migration pathways on the CSC site. The potential sources and pathways were identified based on the current and historical site conditions and operations as described in Sections 2 and 3. The following potential sources of releases of hazardous substances were identified and assessed in this section:

- Former underground storage tanks
- Runoff from Columbia Forge yard
- Black sand import fill
- Historical industrial operations prior to CSC ownership

These features were assessed to identify possible specific sources and associated hazardous substances, the potential for releases of hazardous substances, and the relative volume of the hazardous substances potentially released. The results of this assessment, along with the previous sampling and analysis on the CSC site, was used to identify sampling and analysis activities necessary to further assess the potential for the CSC site to pose a threat to human health or the environment.

5.1 Former Underground Storage Tanks

5.1.1 Former USTs on North Area

Three underground storage tanks were previously located on the North Area of the CSC site. Table 5-1 summarizes the tank characteristics and locations. These former UST locations are shown on Figure 2-4.

Table 5-1
Former Underground Storage Tanks on CSC Site
Crawford Street Corporation Site PA

Name/ Reference	Location	Size (gal)	Contents	Date Installed
Weld Shop	Outside the southwest corner of Building 1 in southeast corner of the Columbia Forge yard.	1,000	Bunker C oil	1950s
Skookum	Northern edge of the Lampros Steel property at the western end of the CSC site.	5,000	Diesel	Prior to 1960
Yard	Northern edge of the CSC site in the Columbia Forge yard	1,000	Gasoline	Late 1960s

All of these USTs were removed in 1987. Soil samples were collected from the excavation of each tank and analyzed for petroleum hydrocarbons. As noted in Sections 3.2.3 and 3.2.4, petroleum hydrocarbons were not detected in two of the samples and were detected at a concentration of 16 mg/kg in the third sample (from the Yard UST excavation). The sample from the "Yard" UST excavation was also analyzed for lead (total and EP Tox). The total lead concentration was consistent with background concentrations and lead was not detected in the EP Tox analysis.

5.1.2 Former UST on South Area

As noted in Section 3.1.4, a UST was discovered during the 1988 Sweet-Edwards/Emcon study. The UST was found in the eastern portion of the South Area. The UST was removed in 1988 and no field evidence of contamination was observed during the tank removal. Two soil samples were collected from the bottom of the tank excavation and a third sample was collected from the fill port area. All three samples were analyzed for oil and grease. Oil and grease was detected in the two excavation bottom soil samples at concentrations of 100 mg/kg and 200 mg/kg. Oil and grease was detected in the soil sample from the fill port area at a concentration of 100 mg/kg. All of these concentrations are less than the applicable DEQ UST Matrix cleanup level (i.e. Level 2, 500 mg/kg) for the CSC site.

5.1.3 Summary of Possible Threats Posed by Former USTs

None of the soil samples collected from the four UST excavations had petroleum hydrocarbons exceeding the applicable DEQ UST Matrix cleanup level (i.e. Level 2). Therefore, there is no potential for any releases from the former USTs to pose a threat to human health or the environment, including causing any impact to the Willamette River water

or sediments. No further assessment of the USTs as possible sources is necessary.

5.2 Runoff From Columbia Forge Yard

The current operations at the Columbia Forge facility include the use of lubricating oils for metal working equipment and cutting lubricants. Incidental spillage and drips of the oils may have occurred from the equipment. Many these operations are currently performed inside enclosed buildings with sound concrete floors. Any releases from these operations would be contained inside the building and would not affect soil or groundwater.

There are some current operations and features that are located in uncovered areas in the Columbia Forge yard. Pavement and soil staining were observed in some of these areas. In particular, staining was observed on the concrete slab beneath the drop forge muffler vessel and beneath the air tank east of Building 2/3. Surface soil staining adjacent to the slabs suggest that oily water may have migrated off of the slabs and onto the adjacent soil.

Incidental drips and spills of oils to the pavement surfaces and adjacent ground surfaces appear to have migrated with storm water runoff to either the yard catch basins or to a low spot near the southwest corner of the yard, which is unpaved. The observed soil staining at the former yard drain outlets near the UPRR suggests possible oily storm water runoff from the Columbia Forge site.

5.2.1 Contaminants of Interest

Based on the presence of petroleum lubricating products in the Columbia Forge yard, the COIs possibly associated with the Columbia Forge yard runoff would be volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs). Based on the metal working that was, and is, performed in the outside areas of the Columbia Forge property, metals are also a possible COI.

There have been no reported releases of PCBs to the soil and there is no reason to suspect that any such releases have occurred. Although there was some electrical equipment with PCBs on the Columbia Forge area, the quantities of such materials would have been small and would have been contained in the equipment. As noted in Section 3.2.3, a very small quantity (2 to 3 ounces) of PCB-containing oil was spilled inside an electrical induction heater cabinet in May 1987. The entire cabinet was removed from the CSC site and disposed properly by General Electric. No PCB oil was released outside the cabinet and no PCBs were released to the ground.

Based on the lack of any reported ship repair or ship building anywhere on the CSC site, there is no reason to suspect that tributyltin (TBT) is present on the Columbia Forge yard (or anywhere else on the CSC site).

Based on the nature of the industrial operations occurring up gradient (i.e. north) of the CSC site, runoff from the uphill properties that could affect the surface soil in the Columbia Forge yard could also contain VOCs, PAHs, and metals.

5.2.2 Possible Surface Water Migration Pathway

As noted in Section 2.2.3, storm water runoff from the Columbia Forge yard is collected in catch basins and conveyed to a sand filter/retention box, which then drains to the area along the UPRR rail spur where the storm water infiltrates into the ground. Under the current system, any particulate matter present in the storm water runoff is removed before the storm water reaches the ground surface. Prior to the installation of the sand filter/retention box, any particulate contaminants conveyed in the storm water runoff from the Columbia Forge yard would have been deposited in the surface soil as the storm water infiltrated into the soil along the UPRR spur.

Because of the relative low solubility of most of the possible yard runoff COIs, runoff contaminants would likely consist mostly of contaminated particulates rather than dissolved contaminants. Dissolved VOCs migrating through the surface water would likely rapidly degrade and/or volatilize into the air.

The area along the UPRR tracks collects storm water runoff from the entire hillside north of the CSC site. During heavy rainfall, including during a site visit for this PA, storm water runoff flows from the properties to the north of the CSC site, across Crawford Street, and onto the CSC site. Significant sheet flow was observed particularly from the abandoned North John Street area into, and across, the Columbia Forge and Lampros Steel storage yard. As noted in Section 2.4, debris, heavy equipment, and disassembled trucks are, and have been, present on these properties and runoff from these properties likely contains petroleum hydrocarbons and metals. Significant surface water runoff also flows down North Richmond Street and North Burlington Street to the UPRR rail spur.

CSC constructed a 200-foot long asphalt berm along the northern edge of Crawford Street yard to reduce the runoff from the upslope sites entering the CSC property. Prior to CSC's construction of the berm, offsite storm water runoff flowed freely across the Columbia Forge yard and into the yard catch basins.

During long periods of heavy rainfall, ponded water along the northern edge of the UPRR tracks may eventually drain into the City of Portland storm water catch basin on North Burlington Street. The City of Portland catch basin is connected to the local combined storm water system, which discharges to the Willamette River at Outfall 52 west of the CSC site. Because this ponded water may include runoff from the Columbia Forge yard (along with runoff from the properties north of the CSC site), there is some potential for storm water runoff from the exterior areas of the Columbia Forge yard to migrate down the storm water drainage system to the Willamette River.

5.2.3 Possible Groundwater Migration Pathway

Most of the Columbia Forge COIs (PAHs and metals) are relatively insoluble and would tend to adsorb to the soil particles rather than dissolve in any infiltrating storm water. If VOCs are present in the surface soil at the Columbia Forge yard, there is some potential for the VOCs (if present) to migrate down through the vadose zone with infiltrating storm water and eventually impact the shallow groundwater. Such infiltration, if it occurred would be limited to unpaved areas of the Columbia Forge operations yard. Only the southwest corner of the yard is unpaved (See Figure 2-4).

The shallow groundwater is expected to flow toward the Willamette River and eventually discharge into the river. Based on the lack of any other beneficial use of the shallow groundwater (See Section 4.1.2) any threat posed by COIs in the shallow groundwater (if present) would be through the discharge of the shallow groundwater to the Willamette River.

5.2.4 Possible Air Migration Pathway

Once yard runoff COIs, if present, are released to the surface soil, there is some theoretical potential for the contaminants to migrate through the air. In particular, soil particulates with adsorbed COIs could become wind born and migrate with blowing dust. The potential for such migration through the air, would be indicated by high COI concentrations in the yard surface soil.

Given the very high dispersion of the contaminated soil particulates that would occur in the air and river, it is highly unlikely that Columbia Forge yard COIs could migrate and materially affect any receptor, including the Willamette River, via the air pathway.

5.3 Black Sand Import Fill

As noted in Section 3.1.3 and 3.1.4, a "black sand" fill has apparently been imported to the CSC site and placed as fill in the South Area, between North Burlington Street and North Leavitt Street. Figure 3-1 shows the inferred, approximate location of the black sand. A previous employee at the sawmill reported that the sand was obtained from a sandblasting company and that the sand had been used to clean oil tanks. The black sand was observed to be present along the shoreline during the site reconnaissance performed for this PA.

Samples of the black sand from the CSC site have been analyzed for:

- Oil and Grease: 400 mg/kg
- PCBs: Not detected
- Total halogenated organics (TOX): 294 mg/kg
- VOCs: Xylene at 0.31 mg/kg

- EP Tox metals: Barium at 0.31 mg/L

Analysis of samples of similar black sand from the City of Portland property west of the CSC site noted similar results.

The presence of petroleum hydrocarbons in the black sand and the presence of the black sand near, and along, the shoreline suggest that releases to the river from the black sand on the CSC site may have occurred.

5.3.1 Contaminants of Interest

Based on the presence of petroleum hydrocarbons in the black sand samples and the presence of PAHs in the EPA sediment sample in the river, PAHs are the primary COI associated with the black sand. The presence of PAHs is also consistent with the reported source of the black sand being sandblast grit previously used to clean oily tanks.

As noted above, xylene was the only VOC detected in the black sand sample. The measured xylene concentration of 0.31 mg/kg is less than 0.1 percent of the EPA Region IX Preliminary Remediation Goal (PRG) for industrial conditions and about 3 percent of the EPA soil screening value for protection of groundwater. The measured concentration is about 0.1 percent of the DEQ Risk Based Concentration based on protection of groundwater for drinking water. Based on the lack of any VOCs in the black sand other than this very low concentration of xylene, and given that VOCs are not a COI in the Willamette River sediments near the CSC site, VOCs are not a COI for the black sand.

Because PCBs were not detected in the previous black sand sample from the CSC site, PCBs are not considered a COI associated with the black sand.

High concentrations of metals are not anticipated in the black sand based on the lack of significant concentrations of EP Tox metals in the black sand sample. However, there is some potential for elevated total metal concentrations to be present in the black sand, regardless of the low to non-detect EP Tox results. The presence of slightly elevated concentrations of lead, arsenic, and mercury in the EPA sediment sample offshore from the CSC site and the presence of the black sand on the shoreline suggest the possibility for the black sand being a source of elevated concentrations of these metals. Based on the lack of other elevated metals in the EPA sediment sample, the proximity of the sediment sample to the black sand, and DEQ's presumption that the sediment sample is an indicator of possible hazardous substance releases on the CSC site, metals other than lead, arsenic, and mercury are not considered black sand COIs.

Notwithstanding the above, it is doubtful whether arsenic is actually a COI for the black sand. The measured arsenic concentration in the sediments offshore of the CSC site (5 mg/kg) is well within typical natural background concentration in the Portland area and only 1 mg/kg greater than the "baseline" concentration established by DEQ. The method

detection limit for the arsenic analyses in the EPA study often exceeded the DEQ baseline concentration. Furthermore, arsenic concentrations in suspended sediment entering the Portland Harbor from upstream sources is in the range of 5 to 10 mg/kg. Therefore, the arsenic concentrations in the sediment offshore from the CSC site are not indicative an upland source of arsenic on the CSC site and arsenic is not considered a COI for the black sand.

There have been no reports or evidence that ship repair or ship painting has ever been performed on the CSC site. Over water activities, off of the CSC site, by previous owners was limited to loading of sand and gravel barges at the far eastern end of the CSC site from early 1900s to the late 1940s. Based on this lack of ship repair activity, tributyltin (TBT) is not a COI for the CSC site. TBT is not associated with the reported source of the black sand (i.e. sandblast from cleaning of tanks).

5.3.2 Possible Surface Water Migration Pathway

Based on the close proximity of the black sand to the river shoreline, COIs present in black sand (if any) could migrate to the river through direct overland surface water flow. Although much of the storm water in the area of the black sand likely infiltrates into the ground, shoreline draws in the black sand area suggest that direct overland flow of surface water occurs. The presence of the black sand on the shore and in direct contact with the river also indicates that there is a surface water pathway from the black sand to the Willamette River.

5.3.3 Possible Groundwater Migration Pathway

Limited groundwater sampling in the area of the black sand did not indicate groundwater contamination. A 1988 Emcon boring noted that the bottom of the black sand fill was 26 feet above the top of the shallow groundwater table. In addition, the black sand COIs (PAHs and metals) are relatively insoluble and would tend to adsorb to the soil particles rather than dissolve in the storm water and migrate downward to the water table. These factors suggest that the black sand COIs have not impacted shallow groundwater at the CSC site.

However, the black sand COIs have not been analyzed in the groundwater samples from the black sand area. Although minute, there is some theoretical potential for the black sand COIs to migrate down through the vadose zone with infiltrating storm water. Given the close proximity of the black sand area to the river, shallow groundwater impacted by the black sand COIs (if any) would likely discharge to the river.

5.3.3 Possible Air Migration Pathway

There is some theoretical potential for the black sand COIs, if present, to migrate through the air. In particular, black sand with adsorbed COIs could become wind born and migrate with blowing dust. The potential for

any of the historical information. If such features were present at the sawmill facility, they likely would have been present well west of the CSC site on the current City of Portland property. Much of the sawmill operations were located on the City of Portland property. A low concentration of pentachlorophenol was detected in a shallow groundwater sample collected about 800 feet west of the CSC site on the City property. No pentachlorophenol was detected in shallow groundwater samples collected closer to the CSC site. This further indicates that any use of wood preservatives on the sawmill property occurred on the City of Portland property west of the CSC site.

There are no known releases of PCBs on the CSC site. Although PCB-containing equipment may have been used (PCBs were commonly used in electrical and industrial equipment) the quantities of such PCB materials would be small. Given the likely presence of such equipment inside the buildings and the presence of pavement over much of the CSC site, there is no basis to assume that PCBs, if present in the equipment, were released to the CSC site soil or groundwater.

As noted previously, there have been no known ship repair or ship building operations on the CSC site. Over water activities, off of the CSC site, by previous owners was limited to loading of sand and gravel barges at the far eastern end of the CSC site from early 1900s to the late 1940s. Therefore, there is no basis to assume that TBT was released (or even ever present) on the CSC site.

Although some machine shops may have used chlorinated solvents for cleaning metal and equipment. Most of the machine shops previously present on the CSC site were not present when chlorinated solvents were historically used in significant quantities (1970s). Furthermore, the quantities of such solvents used would be expected to be small given the relatively small size of the machine shops. All of the machine shops were located within enclosed buildings and the building floors would have contained any spillage or drippage.

The foundry noted in the western portion of the current Columbia Forge area is noted in the 1950 and 1969 Sanborn Maps to have an "earthen" floor. A foundry noted in the northeast portion of the South Area is noted in the 1924 Sanborn Map to have an "earthen" floor. There is some potential for metals to have been present on the earthen floors in these buildings based on typical foundry operations. The metals would be in an inert form and, given the enclosed building, would not migrate. Given that the metal was a valuable product, the metal was likely picked up and returned to the foundry process. All of these areas were subsequently redeveloped and are currently paved. Any surface soil with elevated concentrations of metals that may have been historically present in these areas would have been removed and/or dispersed as part of the site redevelopment.

Based on the above, there is no basis to assume that releases of hazardous substances occurred from the historical industrial operations on the CSC site that could pose a threat to human health or the

environment. No further assessment of the historical industrial activities as possible sources of hazardous substances is necessary.

SAMPLING AND ANALYSIS OF SOURCE/PATHWAYS OF CONCERN

This section presents the sampling and analysis program that will be performed at the CSC site as part of the PA. The purpose of the sampling and analysis will be to assess whether releases of COIs have occurred from potential source(s) and whether released COIs have migrated through the identified potential pathways to the Willamette River or otherwise could pose a potential threat to human health and the environment.

Potential source(s) that require further assessment and their associated COIs are discussed in Section 5. These features of concern and associated COIs are:

Storm Water Runoff From Columbia Forge Yard – PAHs, VOCs, and metals

Import Black Sand in southwest portion of South Area – PAHs, lead, mercury

The sampling and analysis program was developed to assess whether releases have occurred from these possible sources and whether these releases may pose a potential threat to human health and the environment.

6.1 Storm Water Runoff From Columbia Forge Yard

The sampling and analysis program for the Columbia Forge yard storm water runoff was developed based on the specific routes through which a possible release from the yard could pose a threat to human health or the environment. The potential exposure pathways are based on the potential exposure pathways discussed in Section 4.

6.1.1 Worker Contact with Surface Soil

A surface soil sample will be collected from the unpaved portion of the Columbia Forge yard (i.e. the low area near the southwest corner) to assess whether there has been a release to the surface soil that could pose a threat to workers through direct contact (ingestion or dermal exposure routes) or through inhalation. This area is where soil staining was observed during the site reconnaissance and is also the topographical low point where surface water runoff from other areas of the Columbia Forge operations yard accumulates.

A surface soil sample will be collected from the upper 6-inches of soil this area and analyzed for the Columbia Forge COIs (PAHs, metals, and VOCs). The specific laboratory analyses that will be performed are presented in Section 6.4.1 below.

Figure 6-1 shows the surface soil sample location. Other possible areas where direct contact with surface soil with possible COIs due to the Columbia Forge yard runoff (i.e. at former drain outlets along UPRR spur) will be sampled as described in Section 6.1.2 below.

6.1.2 Migration Through Surface Water Drainage to Willamette River Receptors

The potential for COIs to have been released from the Columbia Forge yard and to have migrated to the Willamette River via the surface water pathway will be assessed by collecting surface soil samples from six locations along the UPRR rail spur and analyzing the soil samples for the Columbia Forge COIs. Figure 6-1 shows the proposed surface water flow path soil sampling locations. Table 6-1 summarizes the proposed locations and their rationale. All of these samples are from the inferred surface water flow path along the UPRR tracks.

Table 6-1
Proposed Columbia Forge Surface Water Pathway Surface Soil Sample Locations
Crawford Street Corporation Site PA

Sample	Location	Rationale
SS-2	50 feet west of Richmond Street, along north side of UPRR rail spur.	Assess background soil concentrations along UPRR rail spur
SS-3	At foot of Richmond Street, along north side of UPRR rail spur.	Assess impacts from offsite runoff down Richmond Street.
SS-4	Between southern exit from the Columbia Forge/Lampros Steel yard and the UPRR rail spur.	Assess impacts from offsite runoff onto and through the paved yard.
SS-5	Between outlet drain from catch basin near drop forge and UPRR rail spur.	Area of infiltration for Columbia Forge yard runoff. Assess impacts from Columbia Forge yard runoff
SS-6	Between outlet drain from catch basin at eastern entrance to Building 2/3 and UPRR rail spur.	Area of infiltration for Columbia Forge yard runoff. Assess impacts from Columbia Forge yard runoff
SS-7	At foot of North Burlington Street, along north side of UPRR rail spur.	Assess impacts from offsite runoff down North Burlington Street.

Surface soil contamination is expected to be the most indicative of possible releases to the soil from surface water runoff. Therefore, the soil samples will be collected from the upper 6-inches of the ground surface at the proposed locations shown in Figure 6-1 and described in Table 6-1. The soil samples will be analyzed for the Columbia Forge COIs (PAHs, metals, and VOCs). The specific laboratory analyses that will be performed are presented in Section 6.5.1 below.

6.1.3 Migration Through Groundwater to Willamette River Receptors

As described in Section 4.1.2, the sole possible exposure pathway associated with impacted groundwater at the CSC site is through discharge of the shallow groundwater to the Willamette River bordering the southern edge of the CSC site. Any groundwater impacts resulting from possible releases in the Columbia Forge yard would pose a threat only by migrating and discharging to the river.

A contingent groundwater sampling and analysis program will be performed in the event that the results of the surface soil sampling performed to assess the direct worker contact pathway (Section 6.1.1) and the surface water migration pathway (Section 6.1.2) indicate possible groundwater impacts. Section 6.3 describes the contingent groundwater assessment program.

Whether or not the surface soil analysis results are indicative of possible groundwater impacts will be determined by comparing the measured concentrations of COIs in the surface soil samples against specific criteria. In particular, the criteria against which the surface soil COI concentrations will be compared are as follows:

- If the COI surface concentration does not exceed the concentrations deemed protective of groundwater in the DEQ Oregon Soil Cleanup Table (i.e. concentrations noted with an "a" in the Pathway column), no potential groundwater impacts will be assumed to exist for that COI.
- If the COI is not listed in the DEQ table or is listed under a non-groundwater pathway (e.g. direct contact), the measured surface soil concentration will be compared to the "Migration to Groundwater" criteria listed in Table A-1 of EPA's May 1996, *Soil Screening Guidance: Technical Background Document*. If the measured surface soil concentration does not exceed the EPA Soil Screening value, it will be assumed that there are no potential groundwater impacts.

If the COI concentrations in the surface soil samples exceed the criteria described above, the potential for contaminated groundwater to migrate to the Willamette River will be assessed using the program described in Section 6.3. Only those COIs that exceed the surface soil concentration criteria will be included in the groundwater assessment.

6.2 Import Black Sand

6.2.1 Worker Direct Contact with Surface Soil

One surface soil sample will be collected from where the black sand is exposed at the ground surface along the top of the bank in the South Area of the CSC site. This surface soil sample will be collected to assess whether the black sand represents a release to the surface soil that could

pose a threat to workers through direct contact (ingestion or dermal exposure routes) or through inhalation.

The surface soil sample will be collected from the most heavily stained area exposed at the ground surface. Figure 6-1 shows the approximate location of the proposed surface soil sample. The sample will be analyzed for the black sand COIs (PAHs, lead, mercury). The specific laboratory analyses that will be performed are presented in Section 6.5.2 below.

6.2.2 Leaching to Willamette River Receptors

One surface soil sample will be collected from where the black sand is exposed on the shoreline in direct contact with the Willamette River. This surface soil sample will be collected to assess whether the black sand represents a release to the surface soil that could pose a threat through leaching to the river.

The surface soil sample will be collected from the most heavily stained area exposed at the shoreline. Figure 6-1 shows the approximate location of the proposed surface soil sample. The sample will be analyzed for the black sand COIs (PAHs, lead, mercury).

6.2.3 Migration Through Groundwater to Willamette River Receptors

As described in Section 4.1.2, the sole possible exposure pathway associated with impacted groundwater at the CSC site is through discharge of the shallow groundwater to the Willamette River bordering the southern edge of the CSC site. Any groundwater impacts resulting from possible releases from the black sand would pose a threat only by migrating and discharging to the river. This is especially true considering the close proximity of the black sand to the river.

A contingent groundwater sampling and analysis program will be performed in the event that the results of the surface soil sampling performed to assess the direct worker contact pathway (Section 6.2.1) and the surface water migration pathway (Section 6.2.2) indicate possible groundwater impacts. Section 6.3 describes the contingent groundwater assessment program.

Whether or not the surface soil analysis results are indicative of possible groundwater impacts will be determined by comparing the measured concentrations of COIs in the surface soil samples against specific criteria. In particular, the criteria against which the surface soil COI concentrations will be compared are as follows:

- If the COI surface concentration does not exceed the concentrations deemed protective of groundwater in the DEQ Oregon Soil Cleanup Table (i.e. concentrations noted with an "a" in the Pathway column), no potential groundwater impacts will be assumed to exist for that COI.

- If the COI is not listed in the DEQ table or is listed under a non-groundwater pathway (e.g. direct contact), the measured surface soil

concentration will be compared to the "Migration to Groundwater" criteria listed in Table A-1 of EPA's May 1996, *Soil Screening Guidance: Technical Background Document.* If the measured surface soil concentration does not exceed the EPA Soil Screening value, it will be assumed that there are no potential groundwater impacts.

If the COI concentrations in the surface soil samples exceed the criteria described above, the potential for contaminated groundwater to migrate to the Willamette River will be assessed using the program described in Section 6.3. Only those COIs that exceed the surface soil concentration criteria will be included in the groundwater assessment.

6.3 Contingent Groundwater Migration Pathway Assessment

The potential for COIs present in the Columbia Forge yard or the black sand to have impacted the shallow groundwater, and for the groundwater to have migrated to the Willamette River, will be assessed only if the COIs are detected in the surface soil samples at concentrations exceeding the criteria presented in Sections 6.1.3 and 6.2.3.

The "contingent" groundwater assessment would consist of collecting a groundwater sample at the down gradient edge of the CSC site, directly down gradient from both the black sand area and the Columbia Forge yard. The location of the continent groundwater sample is shown on Figure 6-1.

The groundwater sample will be collected by drilling and installing a groundwater monitoring well. A groundwater monitoring well will be used rather than probe sampling techniques due to the low solubility/high soil-water partition coefficients of the COIs (PAHs and metals). It is doubtful that a sufficiently non-turbid groundwater sample could be collected from a probe exploration given the lack of a properly installed well screen and developed filter pack possible only with an installed well. Because of the affinity that PAHs and metals have for soil particles, analysis of a turbid sample would measure the COIs on the suspended soil particles rather than the dissolved constituents in the groundwater.

The groundwater sample will be analyzed for only the COIs exceeding the surface soil criteria (See Sections 6.1.3 and 6.2.3).

If the groundwater assessment indicates a possible impact to the river through discharge of contaminated groundwater, further groundwater sampling and analysis between the black sand and the Columbia Forge yard will be necessary to assess the source of the groundwater impacts and associated possible threat. Sampling and analysis from up gradient of the Columbia Forge yard will also likely be necessary to assess background water quality and potential offsite sources.

6.4 Sampling Procedures

6.4.1 Surface Soil Samples

Each surface soil sample collected for non-VOC analysis will consist of five subsamples composited into a single sample. The subsamples will be collected in a 5-point dice pattern across an approximately 5-foot by 5-foot area at each sample location.

The purpose of the composite sampling at each location is to obtain a concentration that is representative of how the soil in the area of the sample would impact a possible receptor or migration pathway (e.g. direct contact to a worker or impact on a surface water pathway). A single point concentration is not representative of how the soil contamination in the sample area would affect a possible receptor. Given the small subarea from which each subsample is collected (about 5 square feet), single point concentrations at each subsample location are not representative or useful.

Each sample will be collected using the following procedure:

- Scrape away surface vegetation, if present, at each subsample location.
- Excavate a minimum 6-inch deep hole with a clean shovel at each subsample location. If necessary, a clean pick will be used to penetrate the surface.
- After the hole is excavated, collect the soil sample across the upper 6-inches of the sidewall of the hole with a clean trowel or spoon. Exclude large gravel or organic debris from the sample.
- Place the subsample in the laboratory-supplied glass container. Fill the container about 1/5 with each subsample. Instruct the analytical laboratory to thoroughly mix the sample before collecting the aliquot for analysis.
- Place the filled sample container in a chilled cooler for transport to the analytical laboratory.

Samples collected for VOC analyses will consist of a point sample collected from any stained areas within the composite area. If stained soil is not present in the composite area, the VOC sample will be collected from the center point of the 5-point dice pattern.

The samples will be collected and transported using proper chain-of-custody procedures. Field notes will be maintained noting the general soil conditions and any unusual or unanticipated conditions.

6.4.2 Contingent Groundwater Monitoring Well Installation and Sampling

The groundwater sample will be collected from a drilled and constructed groundwater monitoring well. The methods and procedures that will be

used to drill and construct the well and to collect the groundwater sample from the well are described below.

6.4.2.1 Soil Boring

The groundwater monitoring well boring will be drilled using a truck- or trailer-mounted, hollow-stem auger drill rig. The soil boring will be drilled to the estimated depth of the monitoring well, which will be subsequently constructed. The completion depth is anticipated to be about 40 feet, corresponding to about 10 feet below the top of the shallow groundwater table.

Continuous soil samples will be collected by driving a 5-foot long, nominal 2-inch diameter core barrel sampler using combination of mechanical hammer blows and pushing. The sampling technician will remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be transferred from the core into labeled, laboratory-supplied sample jars using a clean stainless steel spoon. Any extra soil generated during drilling activities will be managed as investigation derived waste (IDW).

Headspace measurements will be made on all soil samples and all soil samples will be observed for field evidence (odor or sheen) of contamination.

The field technician will observe and document the drilling activities including preparing a detailed field log for the boring. The field geologist will describe the soil samples, noting any indications of contamination, and will describe the lithologic characteristics using the Unified Soil Classification System (USCS). Other features such as sorting, sedimentary features, mineralogy, degree of weathering, and contacts with other soil types will also be noted if relevant. In particular, the depth of the black sand encountered in the boring will be logged.

6.4.2.2 Monitoring Well Construction and Development

The groundwater monitoring well will be constructed in the soil borings described in Section 6.4.2.1 in accordance with OAR 690-240 and DEQ guidance, *Groundwater Monitoring Well Drilling, Construction, and Decommissioning* (1992). A start card will be filed by the driller in accordance with OAR 690-240.

The well will be completed using 2-inch diameter, flush-threaded Schedule 40 PVC casing. The screened interval of the well will be 10 feet long and consist of 20-slot machine slotted PVC screen with a PVC end cap threaded to the bottom of the screen. The screened section will be placed below the solid casing near the bottom of the wellbore. The top of the casing will be capped with a lockable, water-tight cap.

A clean silica sand pack will be placed between the boring wall and the PVC screen/riser (i.e., the annulus) from the bottom of the well to approximately one to two feet above the screened interval. A bentonite

seal will be placed above the sand to about one to two feet of the ground surface.

The surface completion will consist of a locking, steel stick-up monument protected with bollards. The monument will be permanently marked with well identification numbers.

The field geologist will document the well construction activities in field notes and a well construction log. Details to be noted include:

- Length of well components.
- Measurements of bentonite, sand, and concrete depths.
- Types, brands, and amounts of materials used.
- Documentation of decontamination.
- Any deviation from standard procedures or problems encountered during the well installation activities.

The drilling contractor will be responsible for conforming to all applicable regulations pertaining to well construction.

The groundwater monitoring well will be developed after construction to minimize the turbidity of the groundwater samples collected for analysis and to optimize the hydraulic efficiency of the well. The well will be developed by surging with a slug rod and purging at least three casing volumes of water from the well using a stainless steel bailer or two-stage pump.

During development, electrical conductivity, temperature, dissolved oxygen, and pH will be measured for each casing volume removed from the well to assess the effectiveness of the development. Development is considered complete when no additional reduction in the turbidity of the well water is observed and after the above parameters have stabilized to within 10 percent for three successive casing volumes. Development water will be managed as IDW.

6.4.2.3 Groundwater Sampling

Groundwater Level Measurements

The groundwater level in the monitoring well will be measured prior to collecting the groundwater sample. The groundwater level will be measured to the reference point marked on the well casing and recorded for the purpose of determining groundwater elevations. The well will be opened and the water level allowed to equilibrate before the measurement is taken. The groundwater level will be measured to the nearest 0.01 foot using an electronic probe.

Purging

After the groundwater level is measured, the well will be purged using a low flow electric pump. The volume of water evacuated from the well will be measured in five-gallon buckets, and the temperature, pH and specific

conductivity of the purged water will be measured at five-gallon intervals. Purging will be considered complete when each measured parameter has stabilized (i.e., three consecutive measurements are within ±10%). In the event that the well is pumped or bailed dry prior to achieving stable field measurements, purging will be considered complete and the volume removed will be recorded on data sheets. Purge water will be managed as IDW.

Collecting Groundwater Sample

A groundwater sample will be obtained from the well immediately after purging using a low flow electric pump. If the well purges dry, the well will be allowed to recover to at least 50 percent of its original volume before collecting the sample. The groundwater sample will be placed directly into laboratory-supplied containers. The container will be placed directly into a chilled cooler for transport to the analytical laboratory. The sample will be collected and transported using proper chain-of-custody procedures.

6.5 Analytical Laboratory Analysis

Laboratory analysis will be performed by North Creek Analytical laboratory in Beaverton, Oregon using EPA methods and QA/QC procedures.

6.5.1 Columbia Forge Yard Surface Soil Samples

Each surface soil sample collected to assess the Columbia Forge yard will be analyzed for the Columbia Forge COIs using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Total Priority Pollutant Metals by EPA 3000 series/6000 series
- TCLP Priority Pollutant Metals by EPA Method 1311/6000 series
- Mercury by EPA Method 7471
- TCLP Mercury by EPA Method 1311/7471
- VOCs by EPA Method 8261

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts (the DEQ Soil Cleanup Table is based on TCLP concentrations for metals).

6.5.2 Import Black Sand Surface Soil Samples

Each surface soil sample collected to assess the black sand will be analyzed for the black sand COIs using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM

- Total Lead by EPA Method 3000 series/6010
- TCLP Lead by EPA Method 1311/6010
- Total Mercury by EPA Method 7471
- TCLP Mercury by EPA Method 1311/7471

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts (the DEQ Soil Cleanup Table is based on TCLP concentrations for metals).

6.5.3 Contingent Groundwater Sample

The specific analyses methods for the groundwater sample collected from the contingent monitoring well will be determined based on the results of the surface soil analyses. In general, the groundwater sample will be analyzed for only those COIs that exceed the screening criteria presented in 6.1.3. or 6.2.3.

6.5.4 Field and Laboratory QA/QC

One field duplicate surface soil sample will be collected to assess the representativness of the surface soil field sampling technique. If VOC analysis is performed on groundwater samples, a trip blank will be prepared by the laboratory and included with the field-collected groundwater sample. The trip blank will be analyzed for VOCs to assess for possible background contamination incurred during handling and transport of the groundwater sample.

A QA/QC review of the laboratory data will be performed once the data is received from the analytical laboratory. This review will include the following:

- Chain-of-custody complete and correct
- Analysis within holding times
- Chemicals of interest in method blanks
- Blank spike recoveries within accuracy control limits
- Blank spike duplicate results within analytical precision control limits
- Surrogate recoveries within accuracy control limits
- Matrix spike recoveries within accuracy control limits
- Matrix spike duplicate results within analytical precision control limits
- Detection limits sufficiently low

On the basis of the results of the QA/QC data review, the data will be flagged according to standard EPA procedures. Questionable data will

be flagged with a "J" and considered an estimated value. Data unacceptable for its intended use will be rejected and flagged with an "R."

6.6 Data Quality Objectives

The data collected during the sampling and analysis program will be used to assess whether any releases have occurred from the suspect sources and whether these releases, if any, pose a potential threat to human health or the environment. This assessment will be performed by comparing the results of the sampling and analysis to conservative screening levels. In particular, the measured concentrations of hazardous substances in the soil samples, if any, will be compared to the following:

- EPA Region IX Preliminary Remediation Goals for industrial sites
- DEQ Risk Based Concentration values for direct worker contact, inhalation, and protection of groundwater pathways.
- DEQ Soil Cleanup Table concentrations
- EPA Soil Screening Concentrations for protection of groundwater

The measured concentrations of hazardous substances in the groundwater, if any, will be compared to ambient water quality criteria given the anticipated beneficial shallow groundwater use as discharge to the Willamette River.

The quality of the field and laboratory data will be sufficient to meet this end use of the data. In particular, the analytical laboratory detection limits will be lower than the screening criteria where possible with typical analytical techniques.

6.7 Reporting

The results of the PA sampling will be presented in a report once the results of the chemical analysis are received from the laboratory. The report will include the following:

- Table showing the results of the chemical analysis.
- Figure showing the location of the surface soil samples and groundwater monitoring well, if installed.
- Description of the soil and general site conditions in the area where the samples were collected.
- Soil boring logs and well construction diagrams for the groundwater monitoring well installation, if installed.
- Discussion of any unanticipated or unusual conditions encountered while collecting the soil samples.

- Relevant photographs taken during the sampling activities
- Copy of the analytical laboratory report.

The report will also include a brief assessment of the potential for releases and migration of hazardous substances based on the results of the PA sampling.

Once the results of the surface soil sample analysis are received from the laboratory, the data will be reviewed and compared to the criteria presented in Section 6.1.3 and 6.2.3. If the criteria are exceeded, a brief memorandum will be prepared and provided to DEQ describing the COIs for which the criteria were exceeded and the resulting COIs that will be considered in the groundwater assessment. The groundwater assessment will then be performed.

The Columbia Forge surface water surface soil sampling results will be compared with the relative COI concentrations in the soil samples from along the UPRR rail spur. In particular, if the COI concentrations in the surface soil samples from where the Columbia Forge storm water runoff has infiltrated are greater than the COI concentrations in the other surface soil samples, additional sampling will be performed. Additional sampling will likely include surface water samples collected during rainfall events at the surface soil sample locations.

A detailed sampling and analysis plan for any necessary additional sampling, including specific sample types and locations, will be prepared as part of the PA sampling report.

If the PA sampling indicates that no additional assessment of the CSC site is necessary after installation and sampling of the contingent groundwater monitoring well, the groundwater monitoring well will be abandoned. The well will be abandoned in accordance with DEQ guidance and the Oregon Water Resource Department rules.

Figures

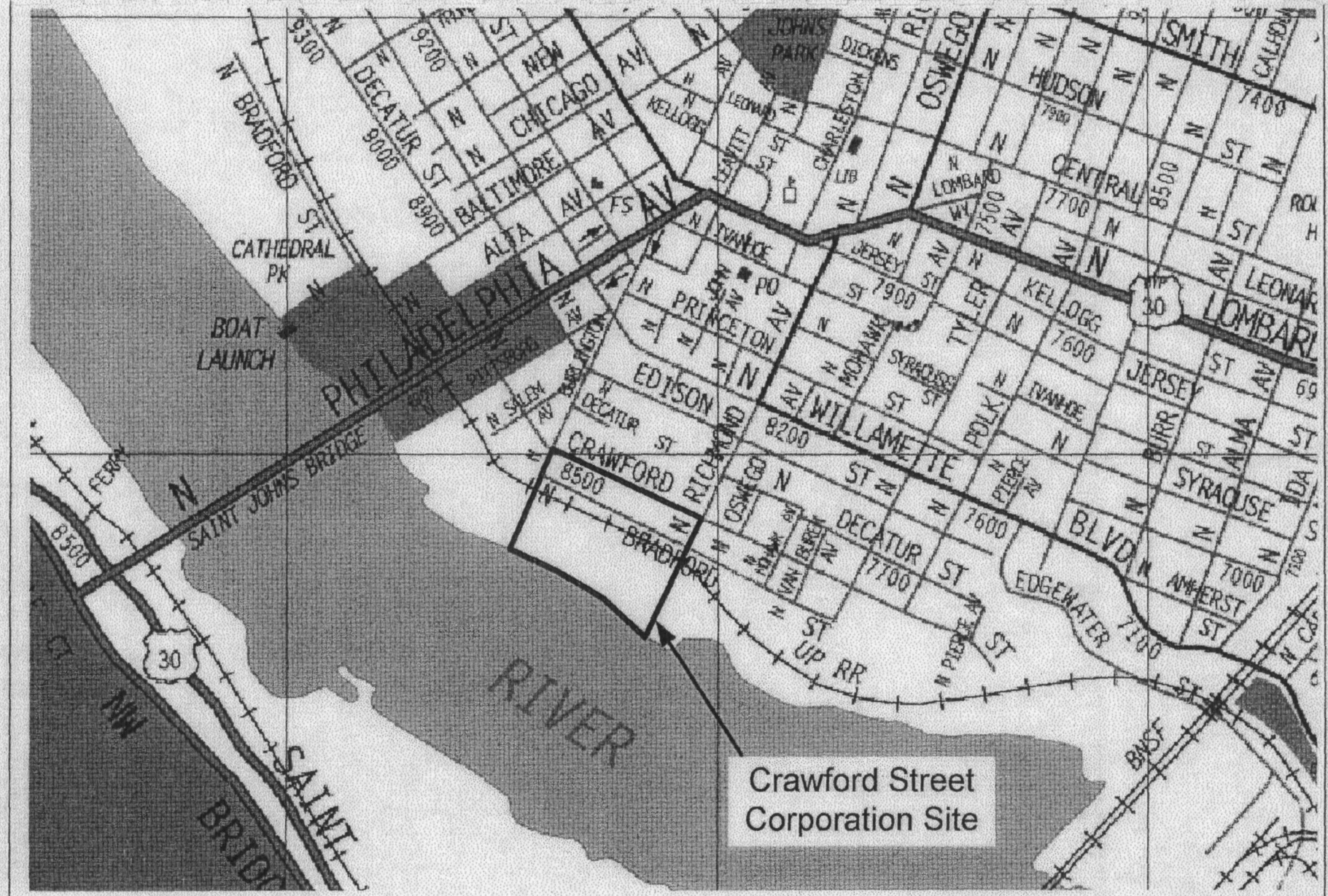


Figure 1-1
Site Location Map
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

CRAW00004582

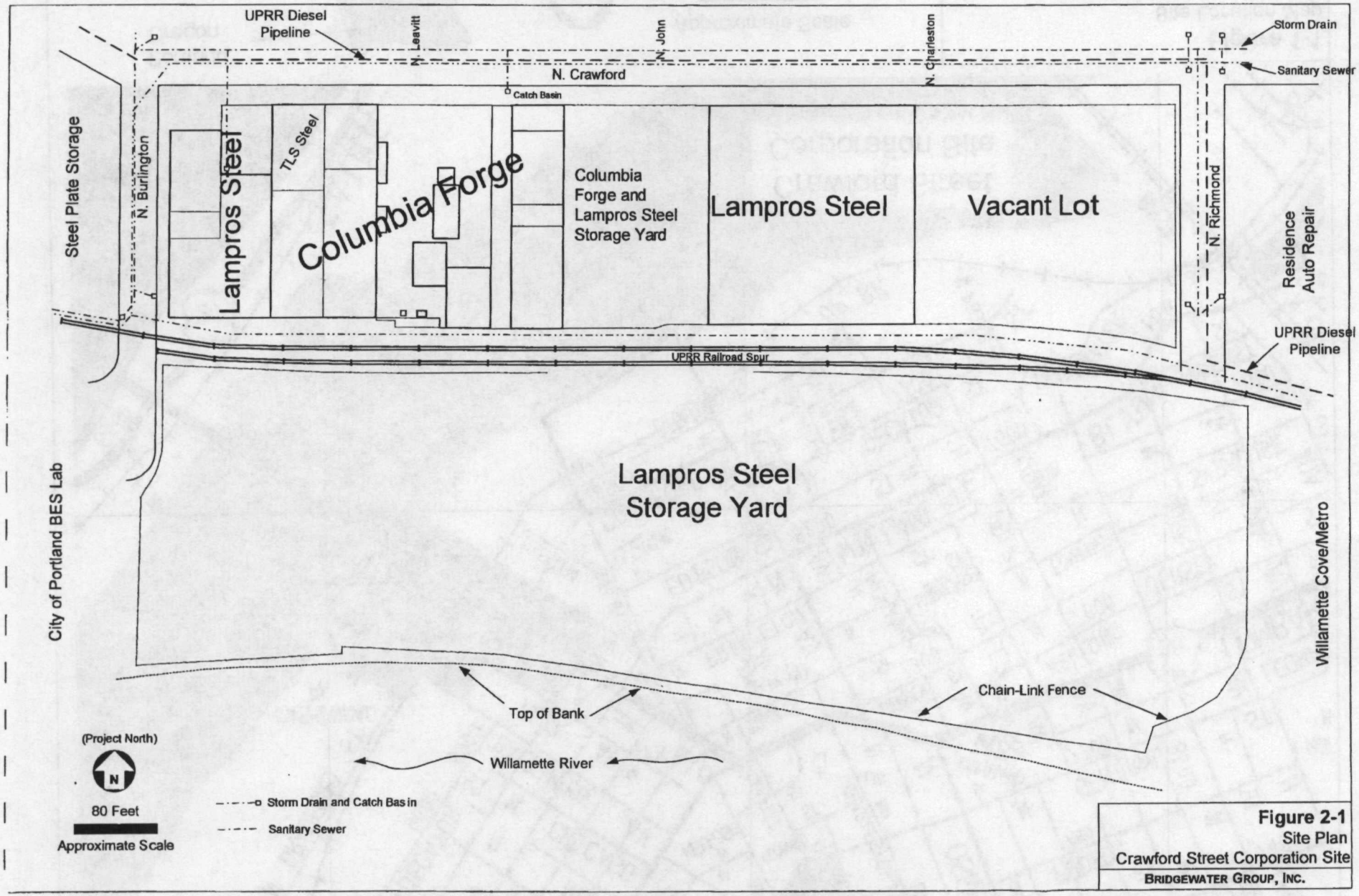


Figure 2-1
Site Plan
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

CRAW00004583

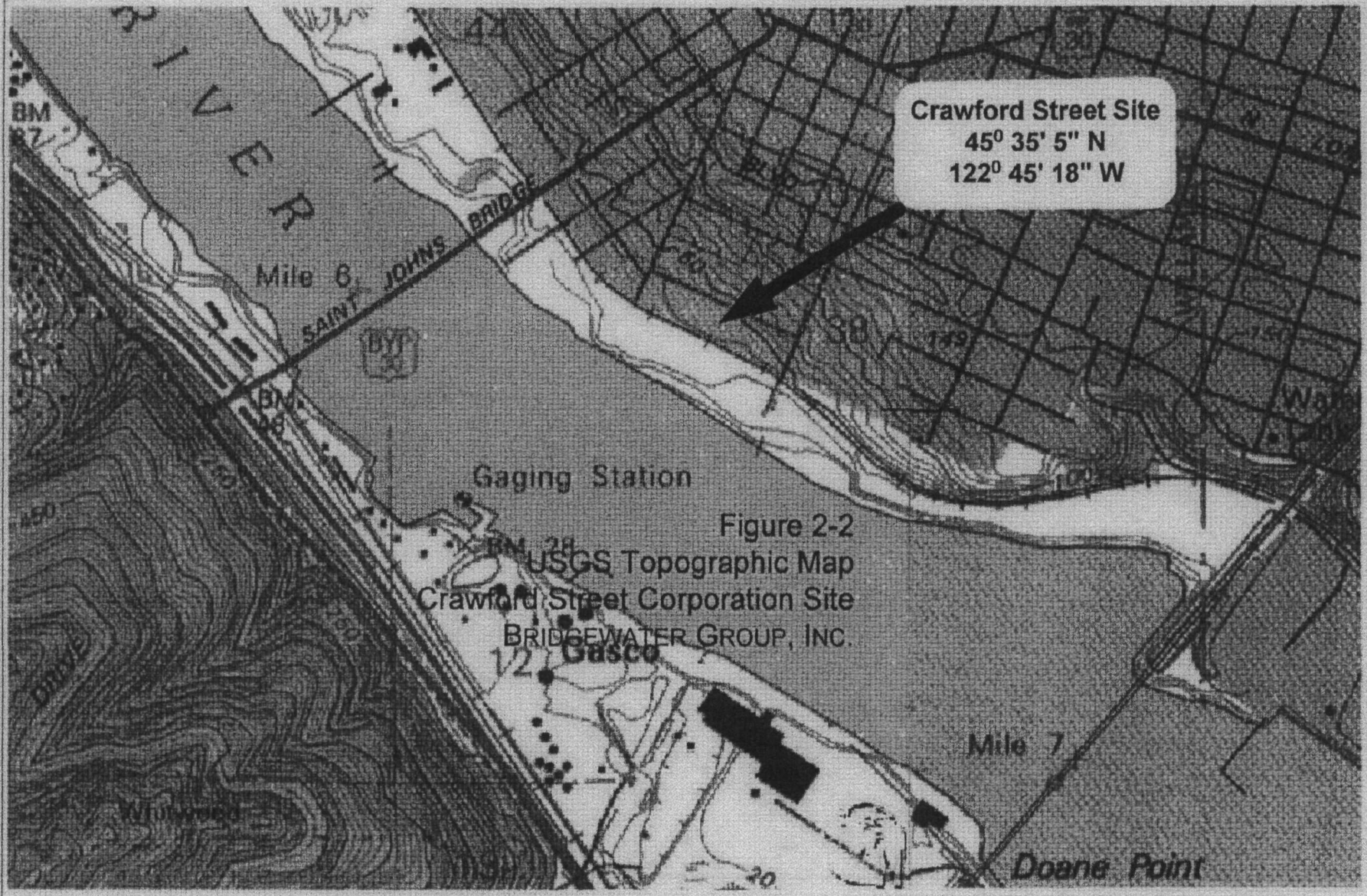


Figure from USGS
Topographic Map Linnton
and Portland Quadrangles
Photorevised 1990

Approximate Scale

833 feet

Figure 2-2
USGS Topographic Map
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

CRAW00004584

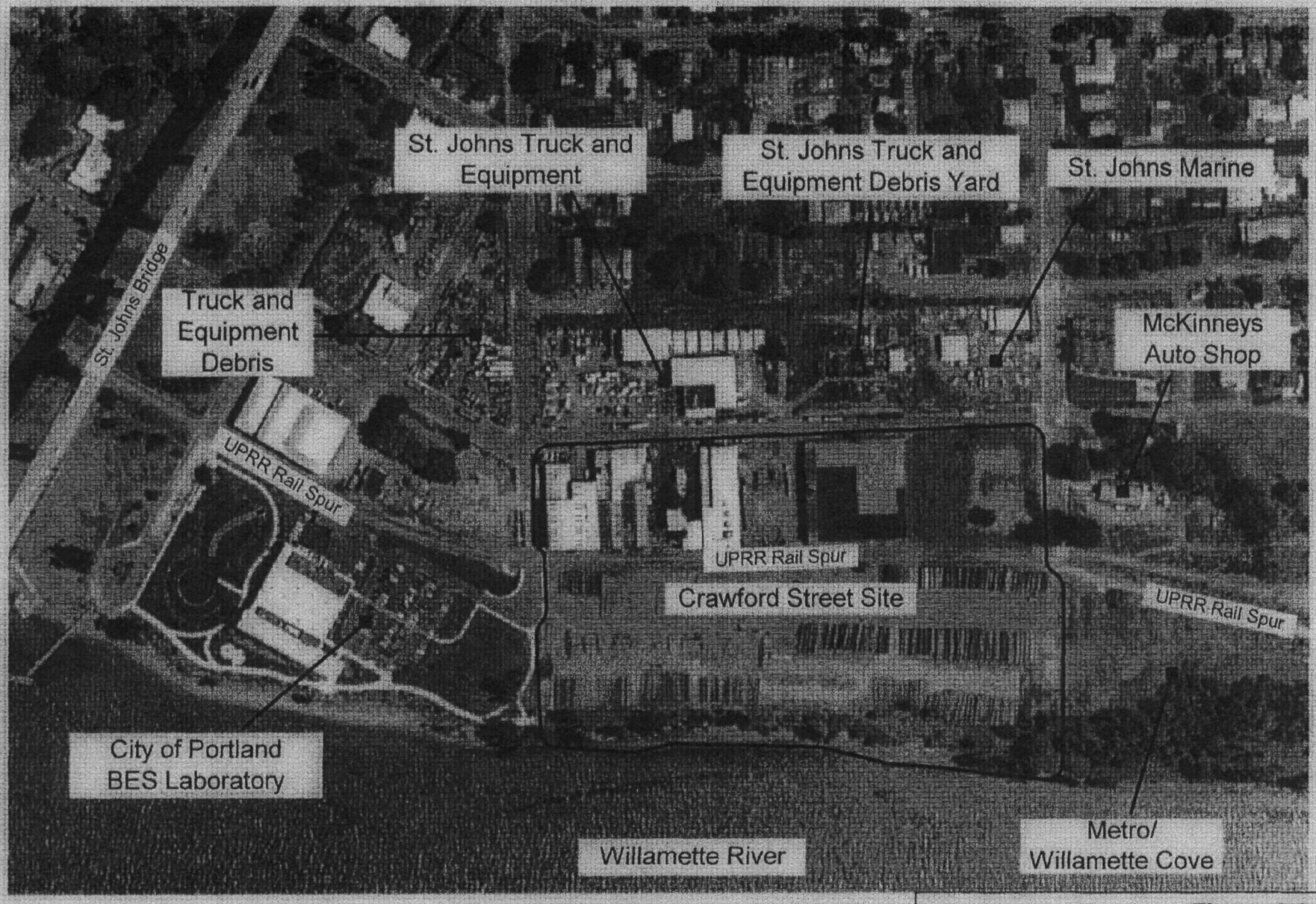


Figure 2-3
1998 Aerial Photograph
Crawford Street Corporation Site

BRIDGEWATER GROUP, INC.

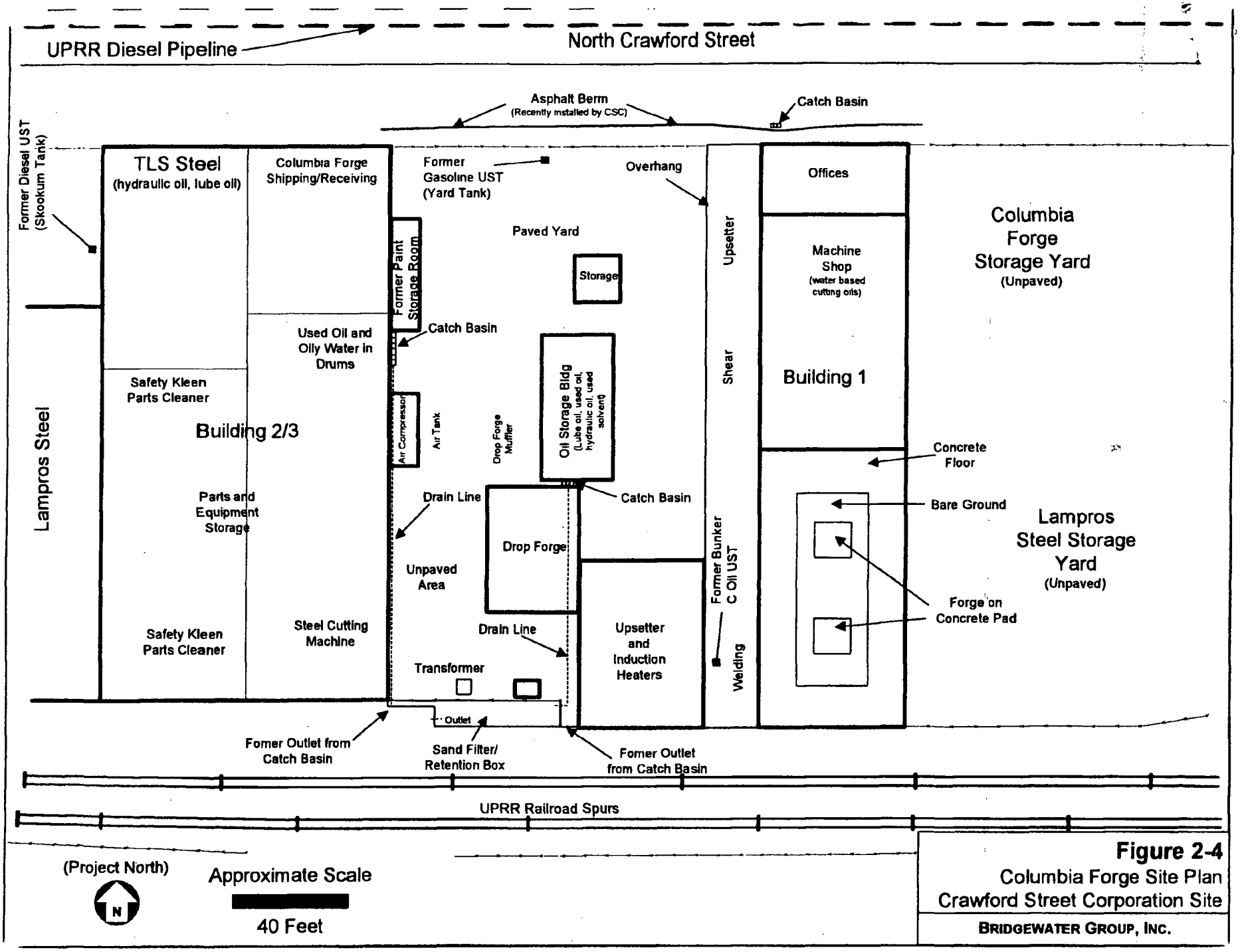


Figure 2-4
Columbia Forge Site Plan
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

CRAW00004586

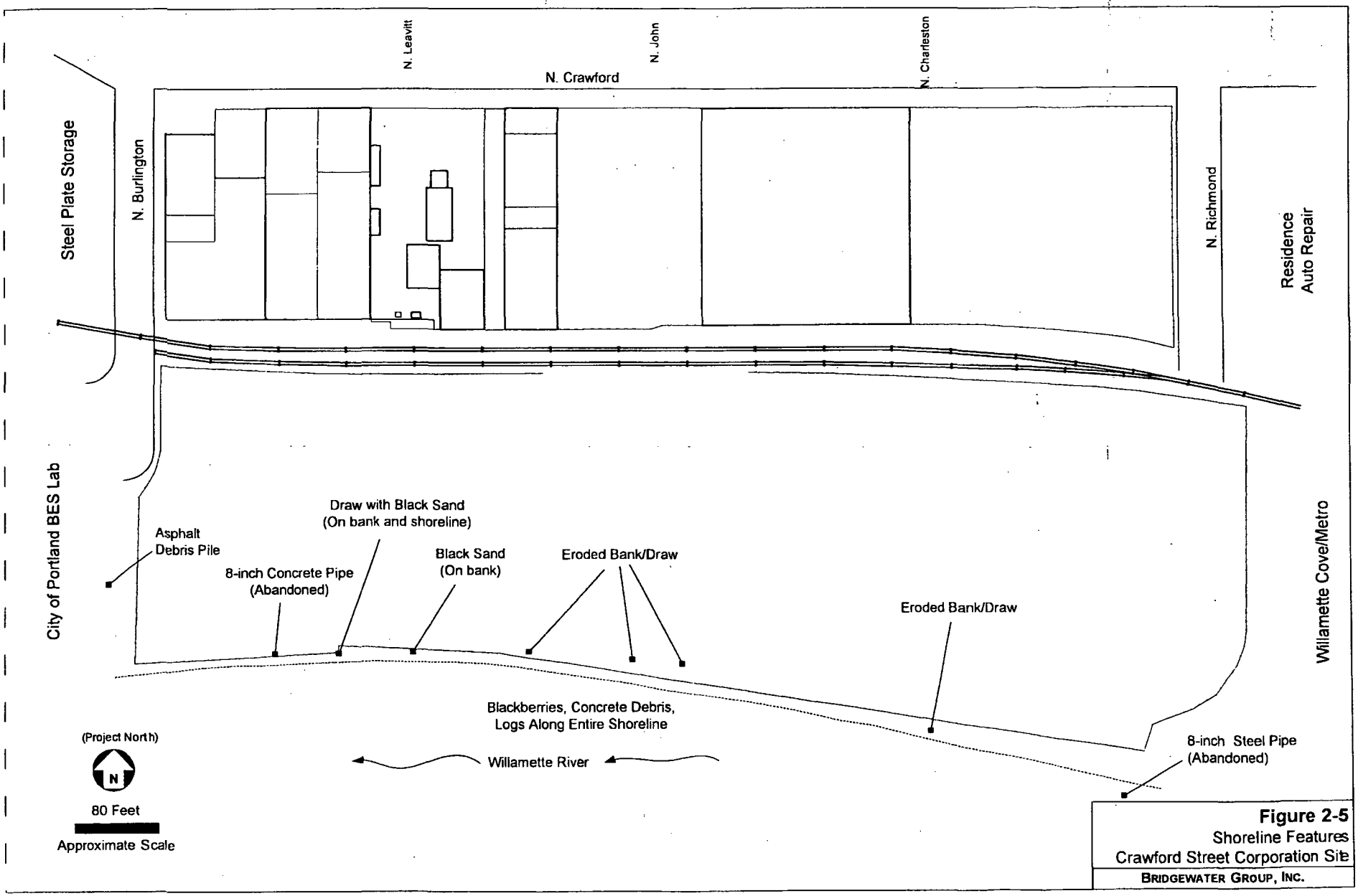


Figure 2-5
Shoreline Features
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

CRAW00004587

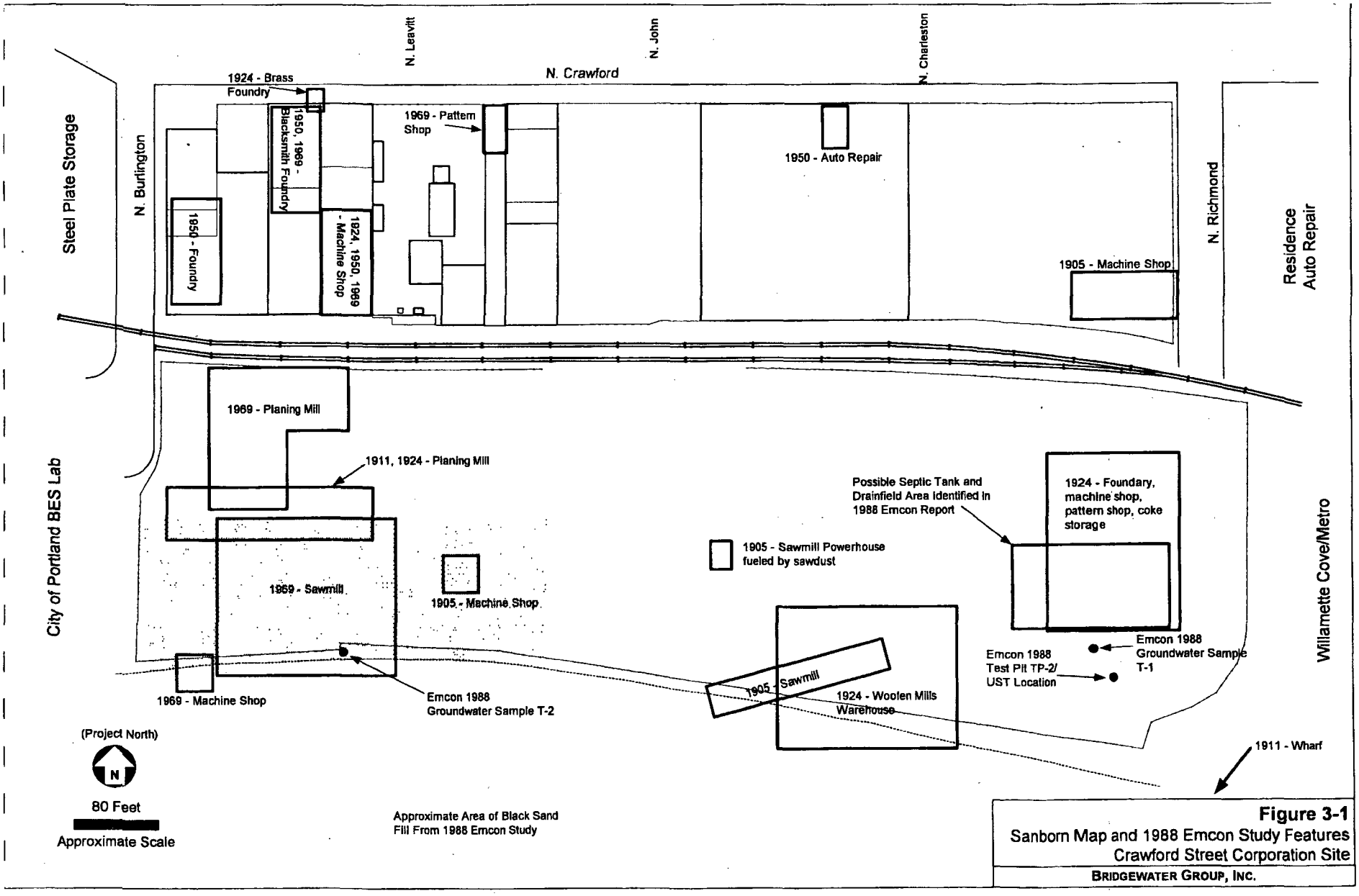


Figure 3-1
Sanborn Map and 1988 Emcon Study Features
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

CRAW00004588

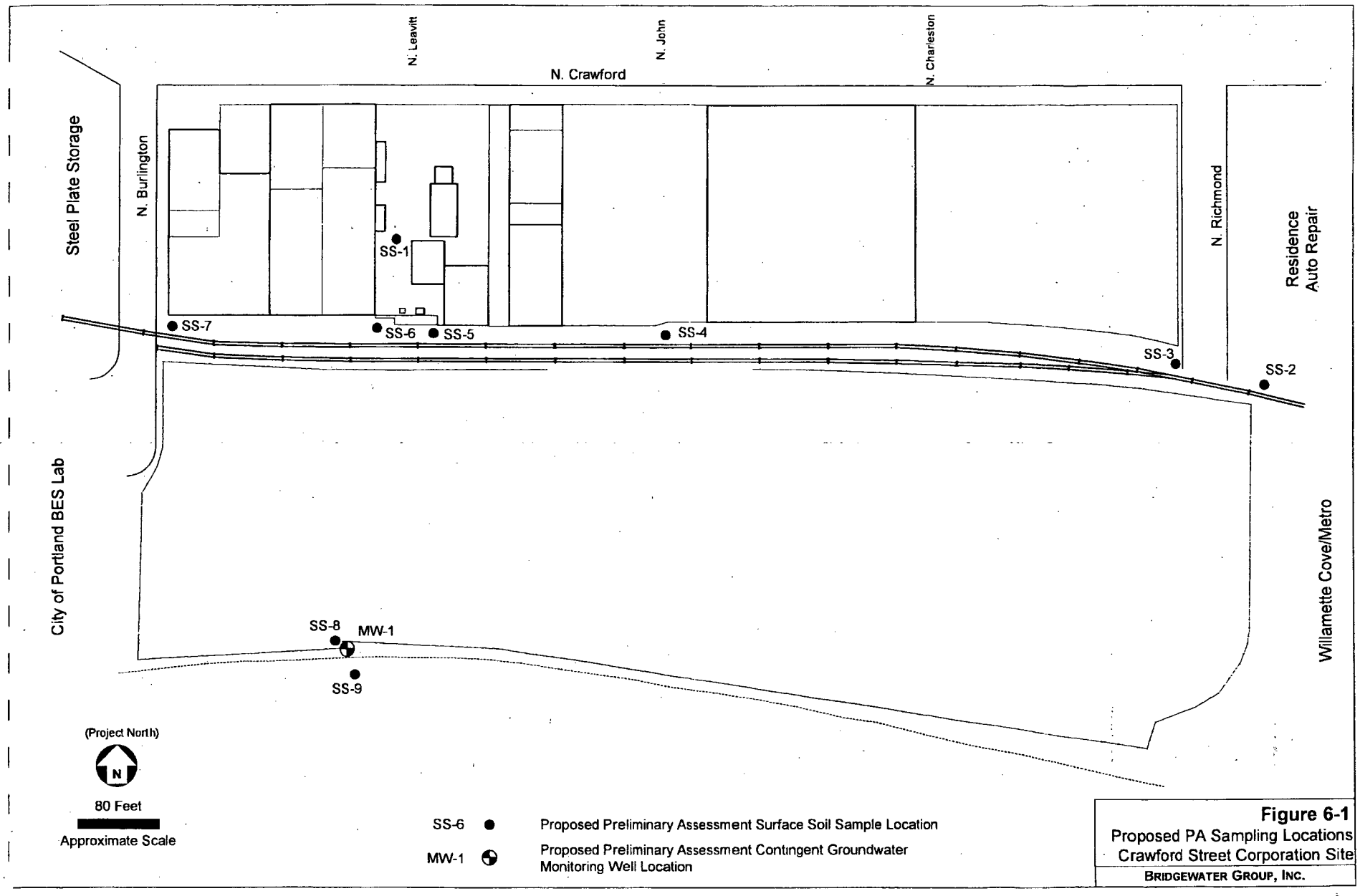


Figure 6-1
Proposed PA Sampling Locations
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

CRAW00004589

Appendix A

APPENDIX A

PHOTOGRAPHS OF CURRENT SITE CONDITIONS

APPENDIX A

PHOTOGRAPHS OF CURRENT SITE CONDITIONS

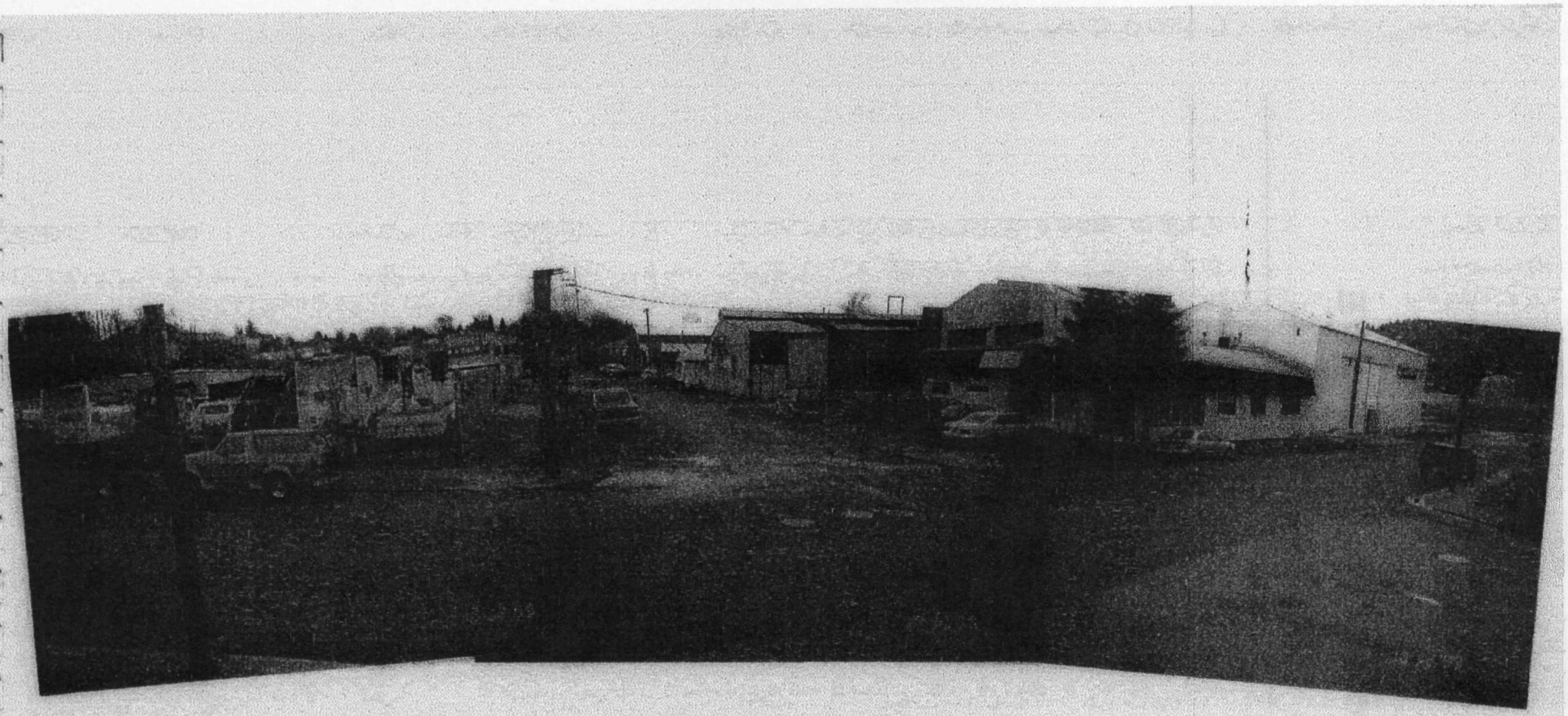


Photo No. 1 Photo Date: 12/9/99

Looking southeast from intersection of North Burlington and North Crawford Streets.

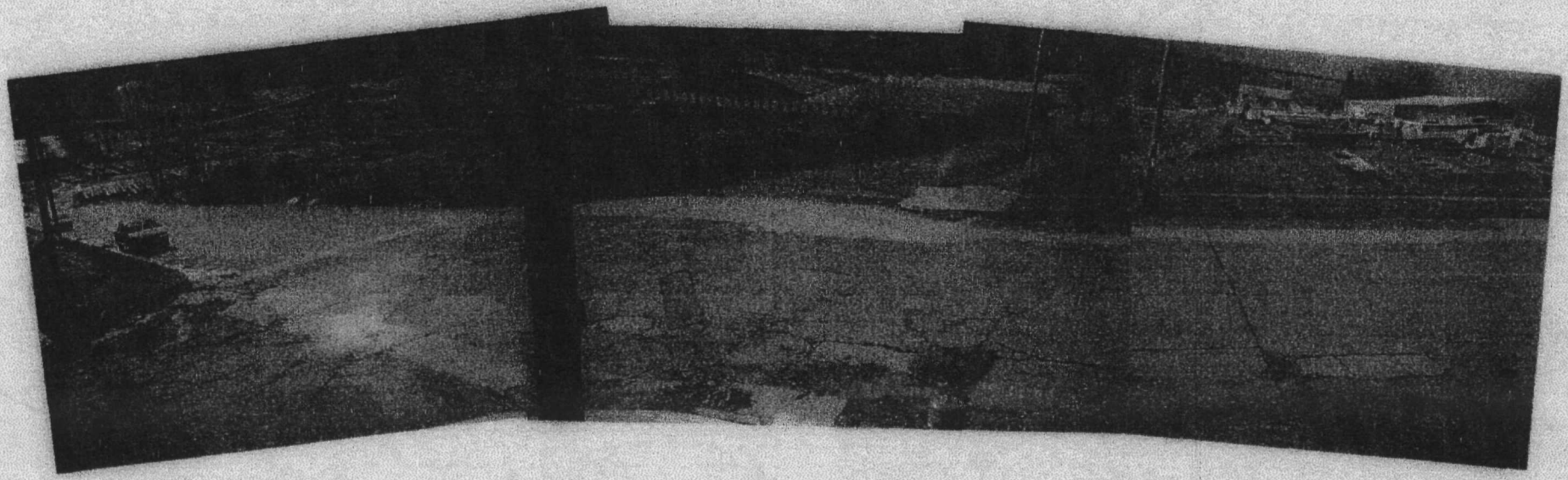


Photo No. 2

Photo Date: 12/9/99

Looking southwest from intersection of North Richmond and North Crawford Streets.

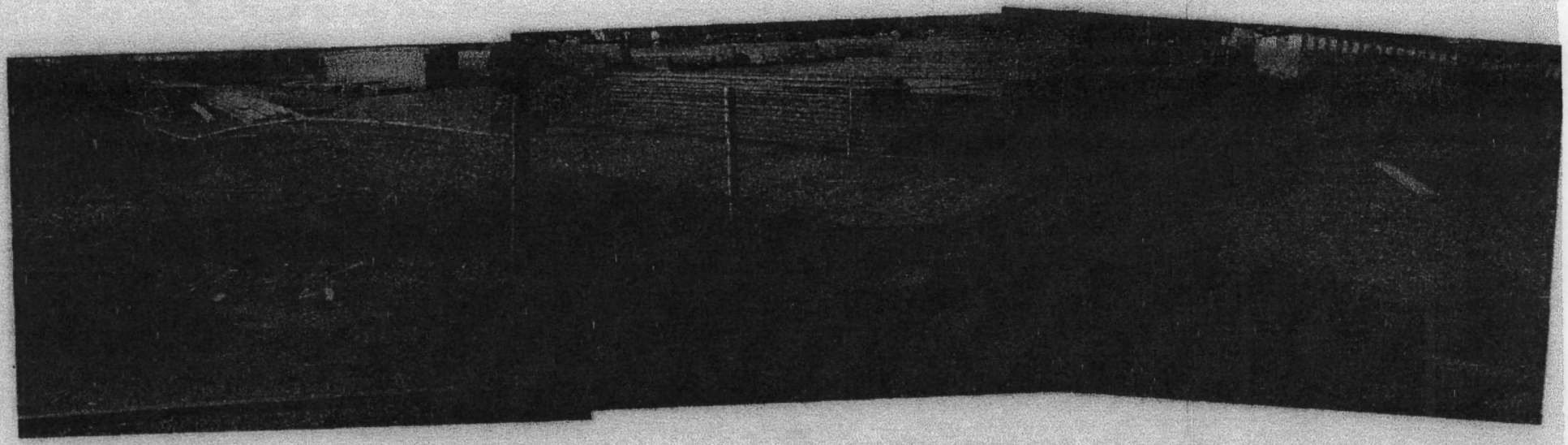


Photo No. 3 **Photo Date: 4/28/99**

Looking southwest into South Area (Lampros Steel storage yard) from intersection of UPRR rail spur and North Richmond Street.

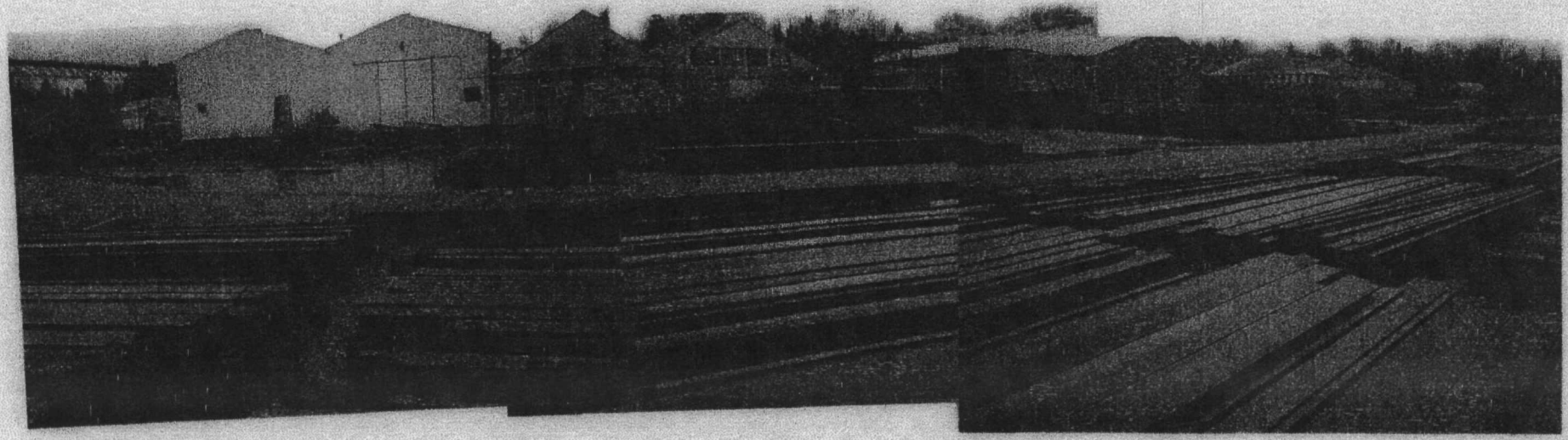


Photo No. 4 **Photo Date: 12/9/99**

Looking north across South Area (Lampros Steel storage yard) at south side of Columbia Forge and Lampros Steel.

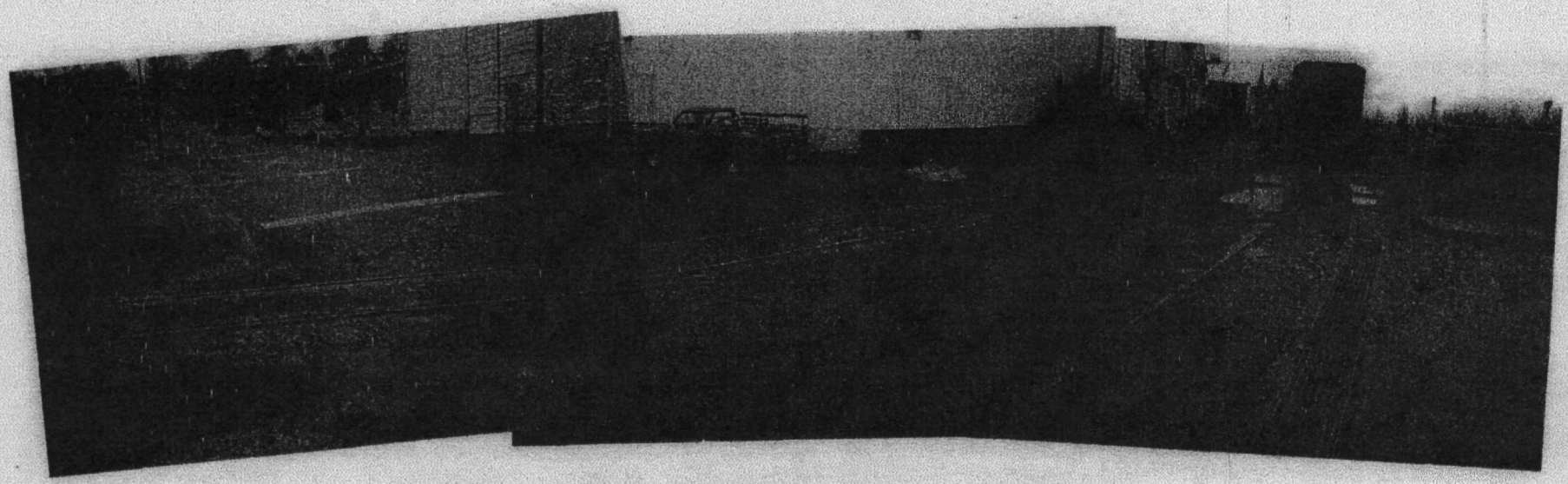


Photo No. 5

Photo Date: 12/9/99

Looking northeast from intersection of North Burlington Street and UPRR rail spur.

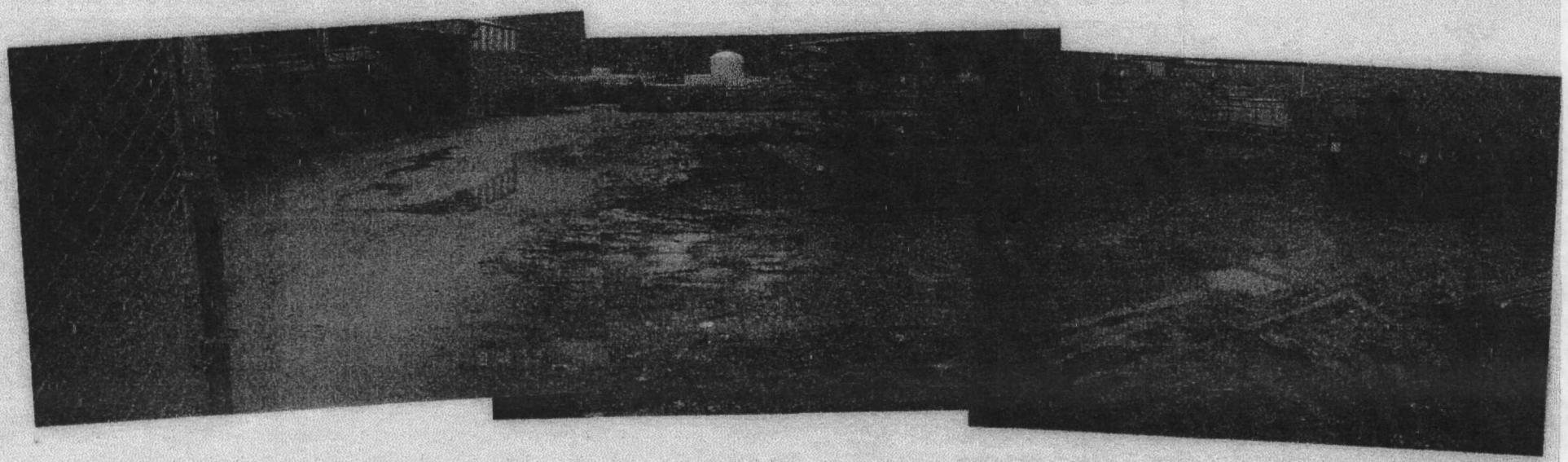


Photo No. 8

Photo Date: 12/9/99

Looking south across Columbia Forge/Lampros Steel yard.

Photo No. 7

Photo Date: 12/9/99

Columbia Forge Yard. Looking northwest.

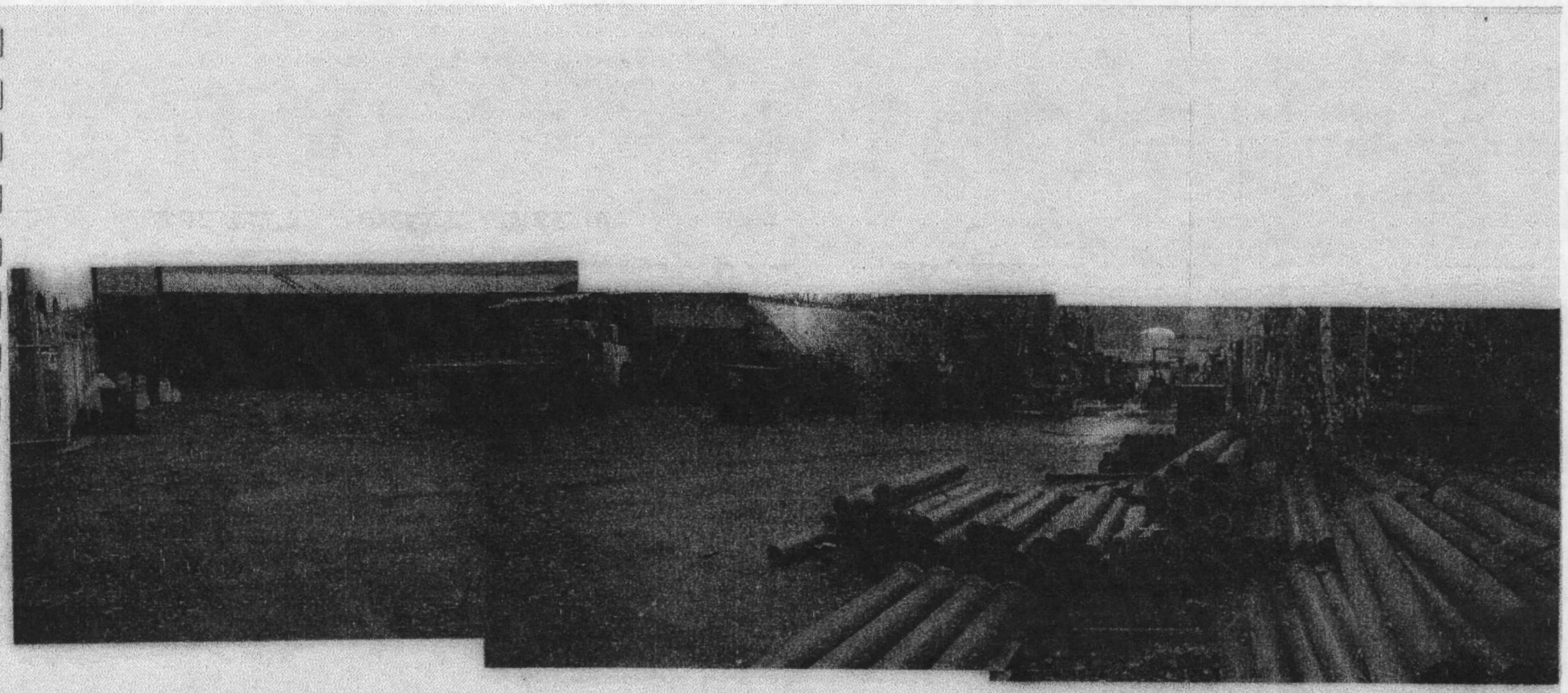


Photo No. 8

Photo Date: 12/9/99

Columbia Forge Yard. Looking southeast.

Photo No. 9 **Photo Date: 12/9/99**

Southwest area of Columbia Forge Building 1. Looking south.

Photo No: 10 **Photo Date: 12/9/99**

Machine Shop in north portion of Columbia Forge Building 1.

Photo No. 11 **Photo Date: 12/9/99**

Inside Lampros Steel

Photo No: 12 **Photo Date: 12/9/99**

Inside Lampros Steel building at west end of site.

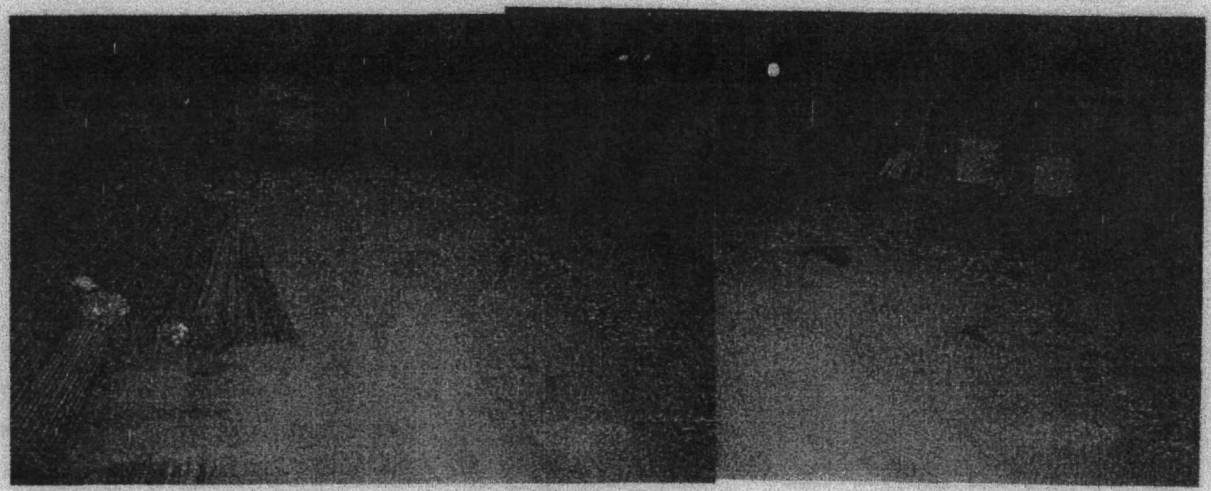


Photo No. 13

Photo Date: 12/9/99

Inside Lampros Steel building at west end of site.

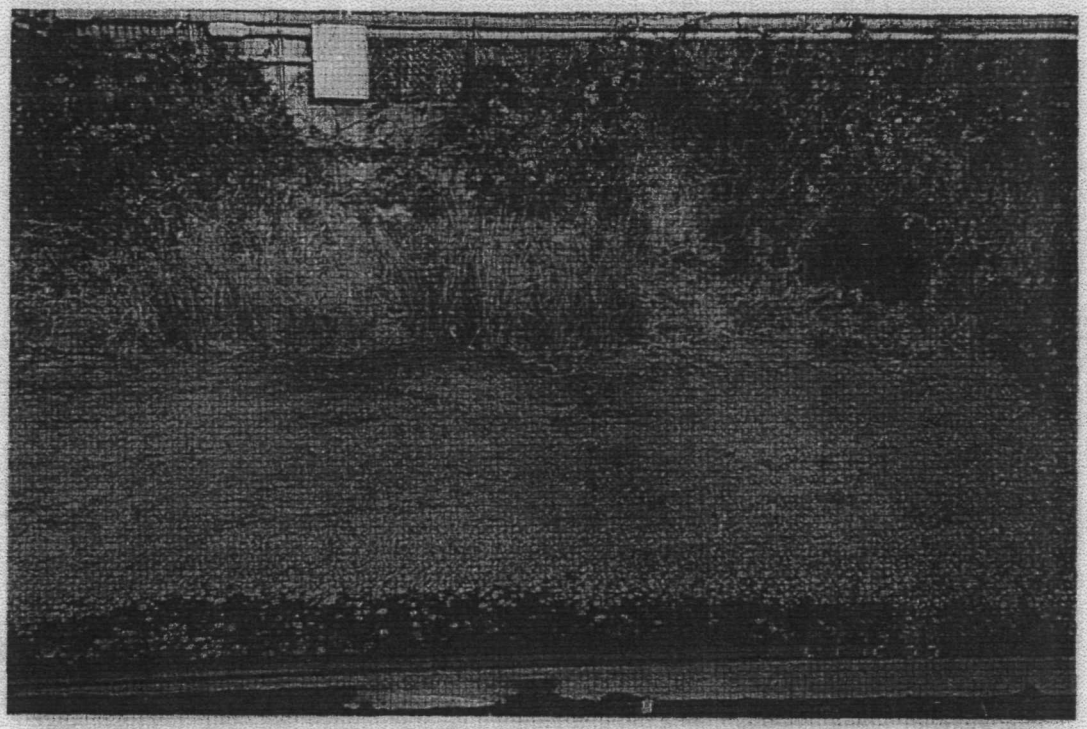


Photo No. 14 **Photo Date: 12/21/99**

Looking north at drain line outlet from west end of Columbia Forge yard.

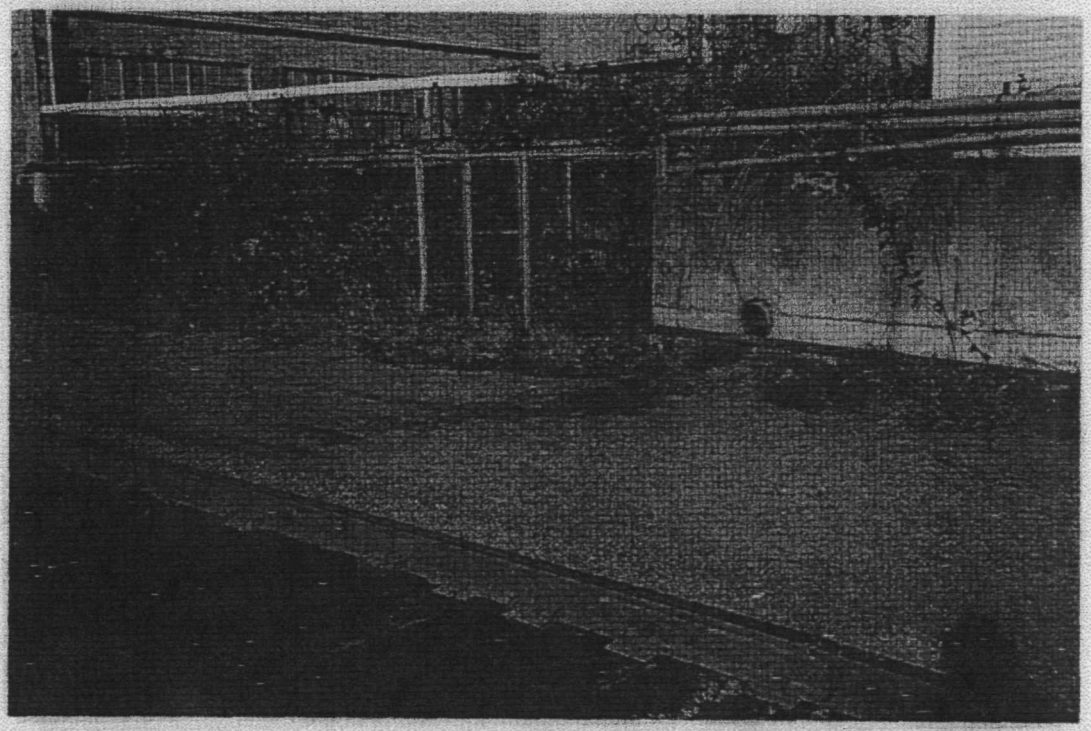


Photo No: 15 **Photo Date: 12/21/99**

Looking north at drain line outlet from east end of Columbia Forge yard.

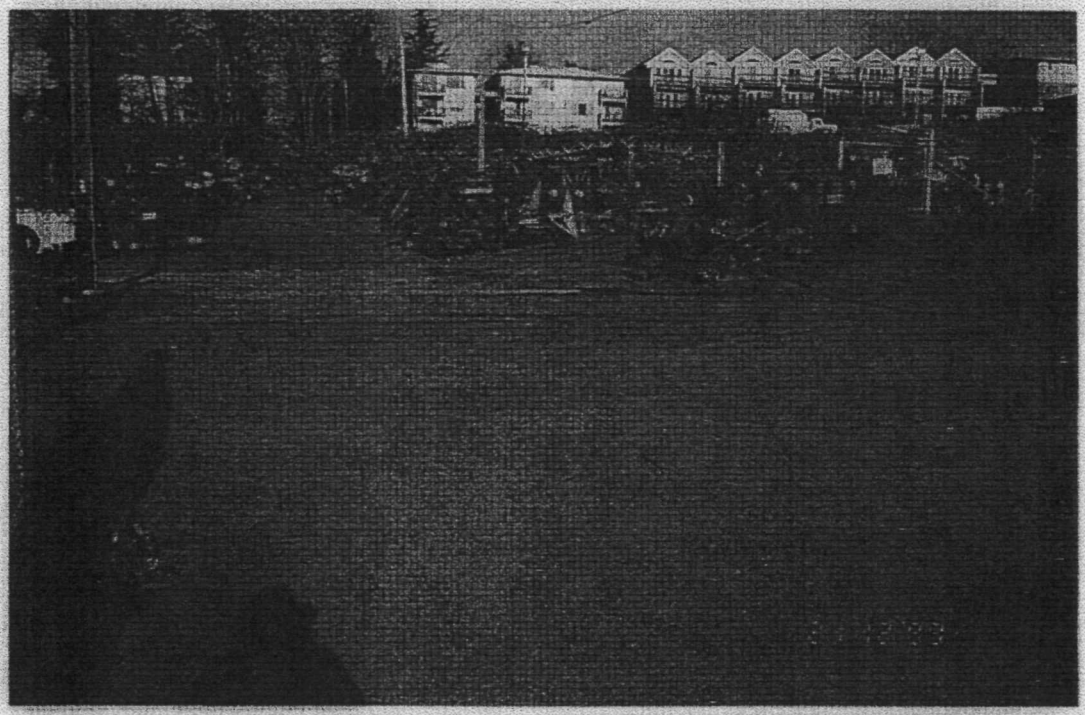


Photo No. 18 **Photo Date: 12/21/99**

Looking north from north side of Columbia Forge/Lampros Steel yard at St. Johns Truck and Equipment debris yard. Storm water runs from this area, across Crawford Street, and on to and across the storage yard.

Photo No: 19 **Photo Date: 12/21/99**

Stained wash area adjacent to Crawford Street at St. Johns Truck and Equipment. Across Crawford Street from Columbia Forge.

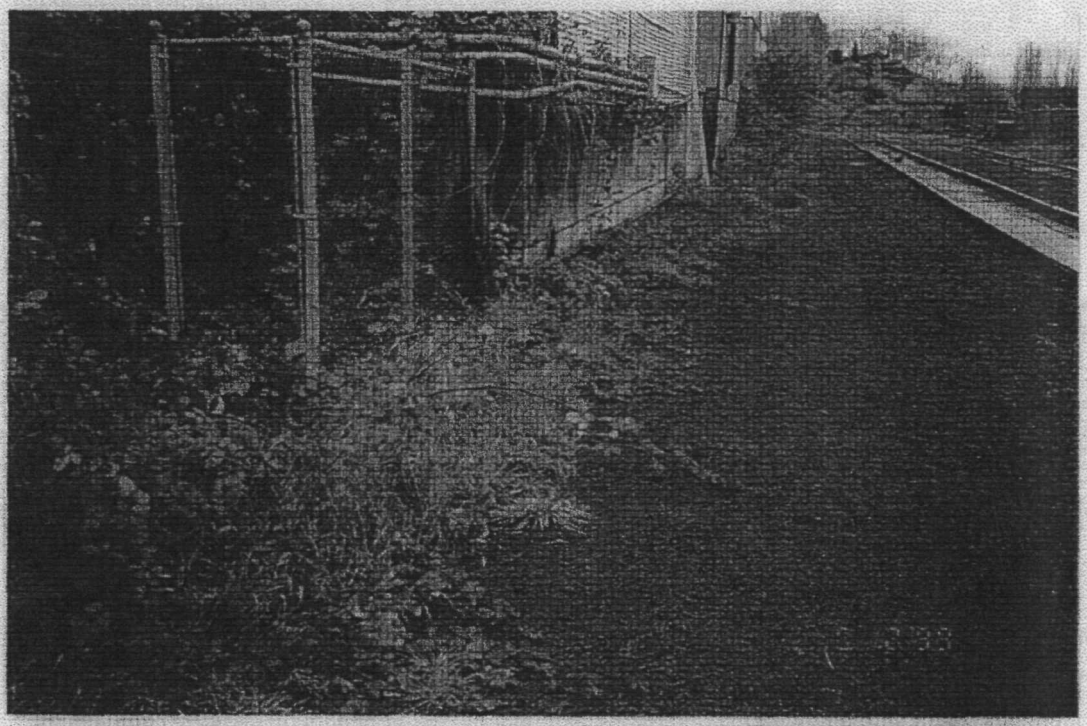


Photo No. 16 **Photo Date: 12/9/99**

Looking east along UPRR rail spur from south side of Columbia Forge yard.

Photo No: 17 **Photo Date: 12/21/99**

Typical river bank conditions.

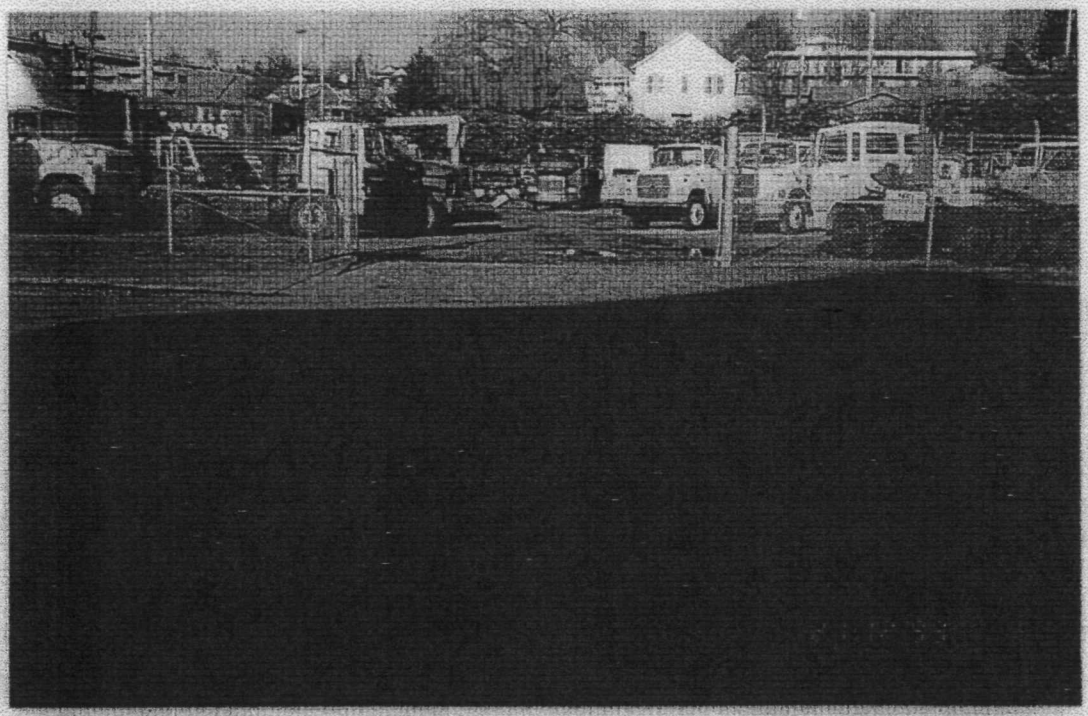


Photo No. 20 **Photo Date: 12/21/99**

Looking north at St. Johns Truck and Equipment truck storage yard. Storm water runs from this area, across Crawford Street, and on to and across the Lampros and TLS Steel areas.

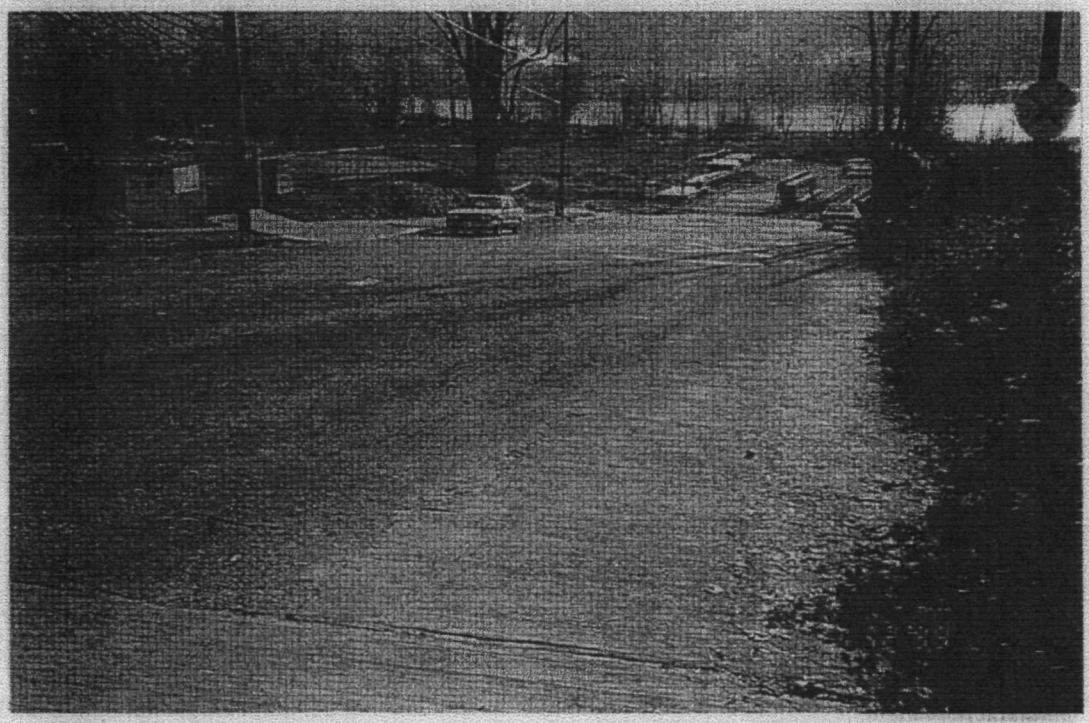


Photo No: 21 **Photo Date: 12/21/99**

Looking south down North Richmond Street. Storm water flows down this street to UPRR rail spur area and to the Lampros Steel south storage yard.

Photo No. 22 **Photo Date: 12/21/99**

Looking west from east of site along UPRR rail spur. Note fresh oil stain in rail alignment east of Crawford Street. Stain drips continue onto the Crawford Street site.

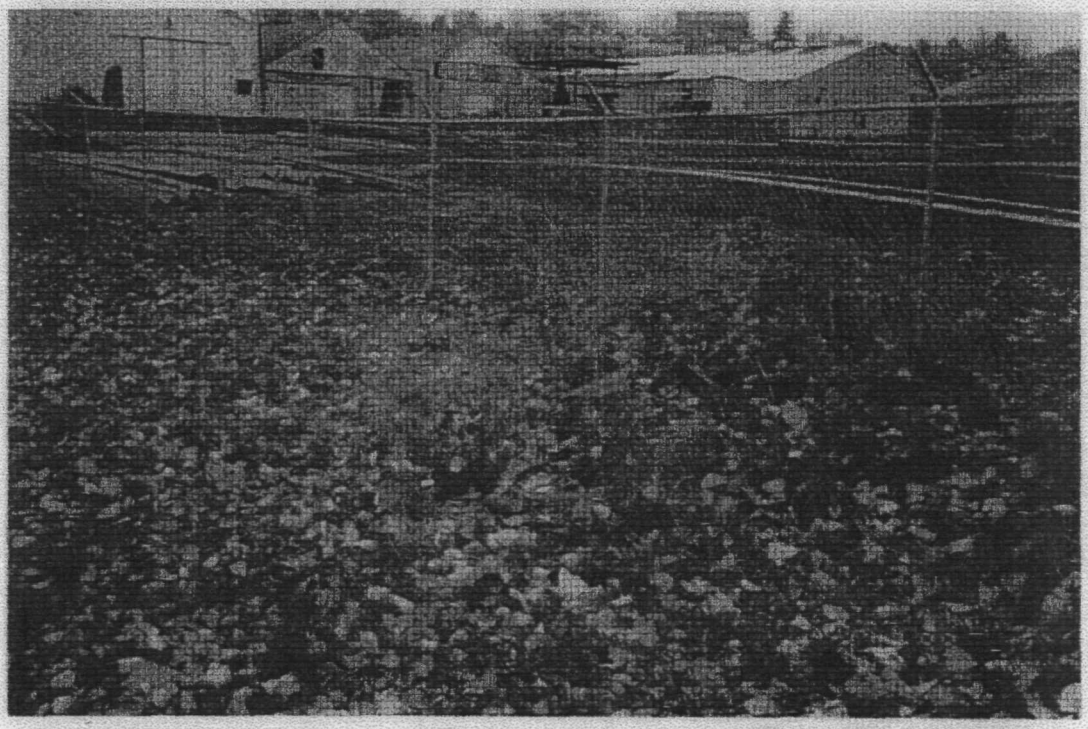


Photo No: 23 **Photo Date: 12/9/99**

Looking northeast from City of Portland property west of Crawford Street site. Note asphalt and concrete debris pile on City property.

Photo No. 24 **Photo Date: 12/21/99**

Looking south from hill above site. St. Johns Truck and Equipment debris yard north (up gradient) of Crawford Street site.

Photo No: 25 **Photo Date: 12/21/99**

Looking north from south end of Columbia Forge/Lampros Steel yard at UPRR rail spur. St. Johns Truck and Equipment debris yard in distance. Lampros Steel beam cutting building on right.

Photo No. 26 **Photo Date: 6/5/00**

Transformer in southwest portion of Columbia Forge operations yard. Looking southwest.

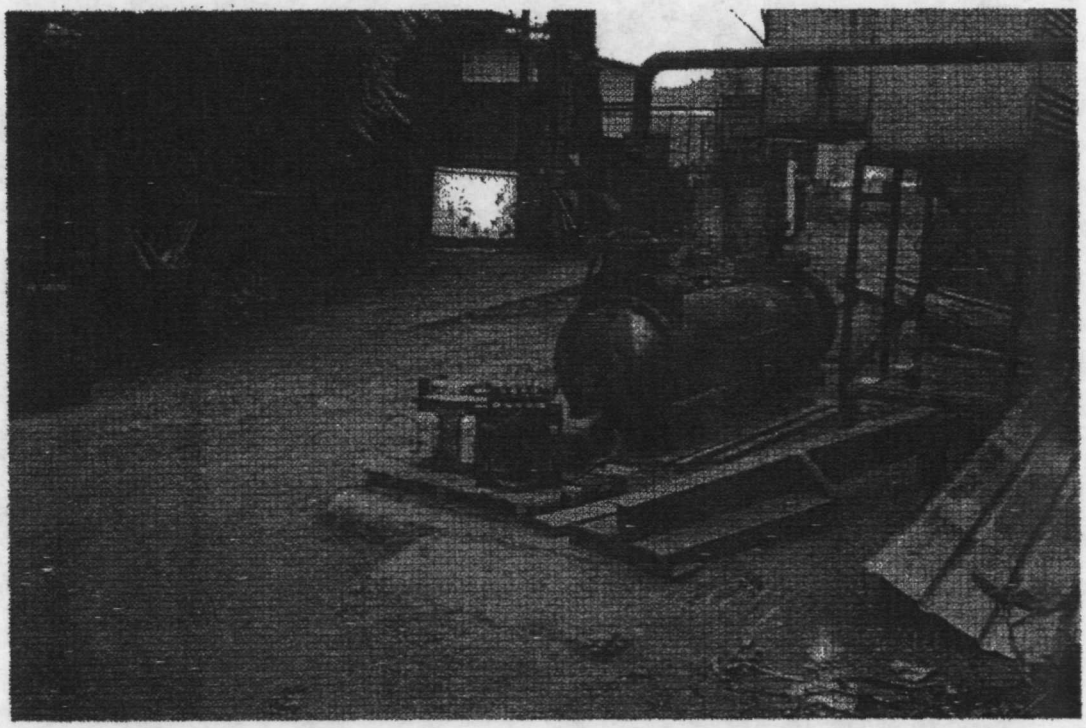


Photo No: 27 **Photo Date: 6/5/00**

Looking southeast in western portion of Columbia Forge operations yard.

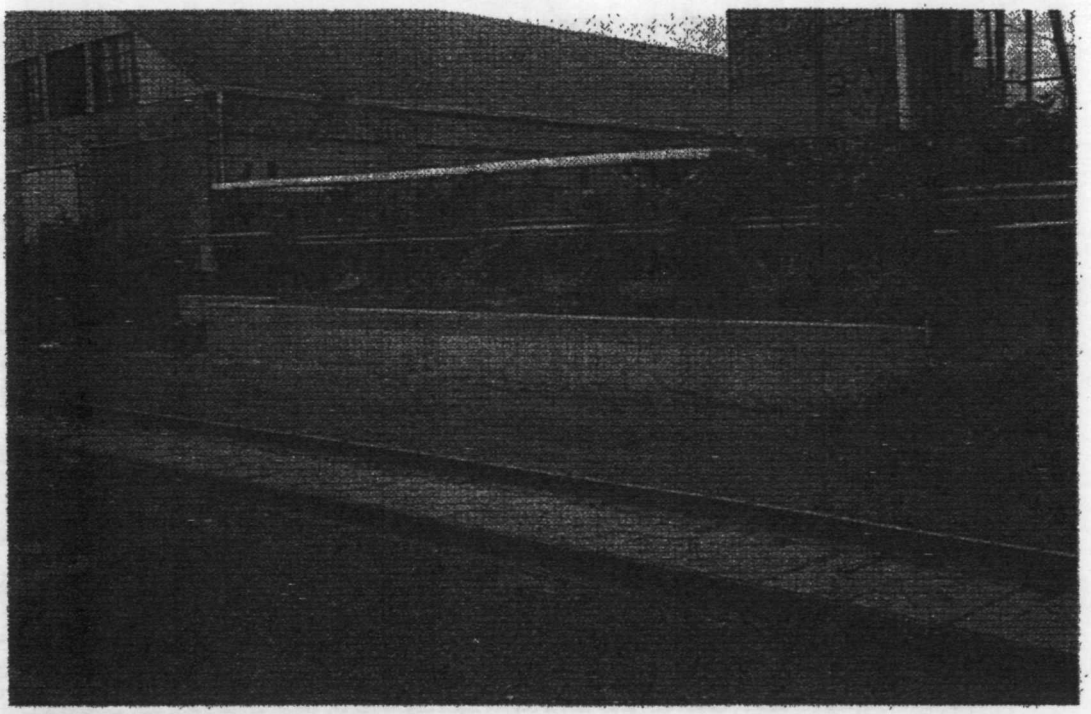


Photo No. 28 **Photo Date: 6/5/00**

Looking northwest at sand filter/retention box at south end of Columbia Forge operations yard.

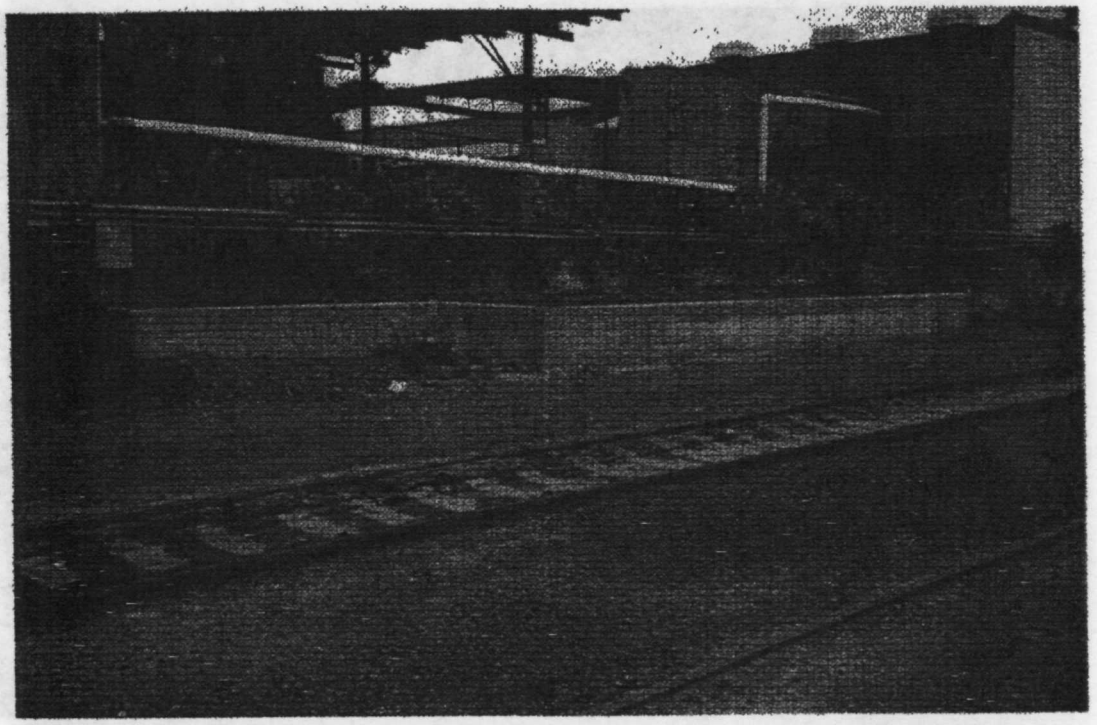


Photo No: 29 **Photo Date: 6/5/00**

Looking northeast at sand filter/retention box at south end of Columbia Forge operations yard.

Photo No. 26 **Photo Date: 6/5/00**

Transformer in southwest portion of Columbia Forge operations yard. Looking southwest.

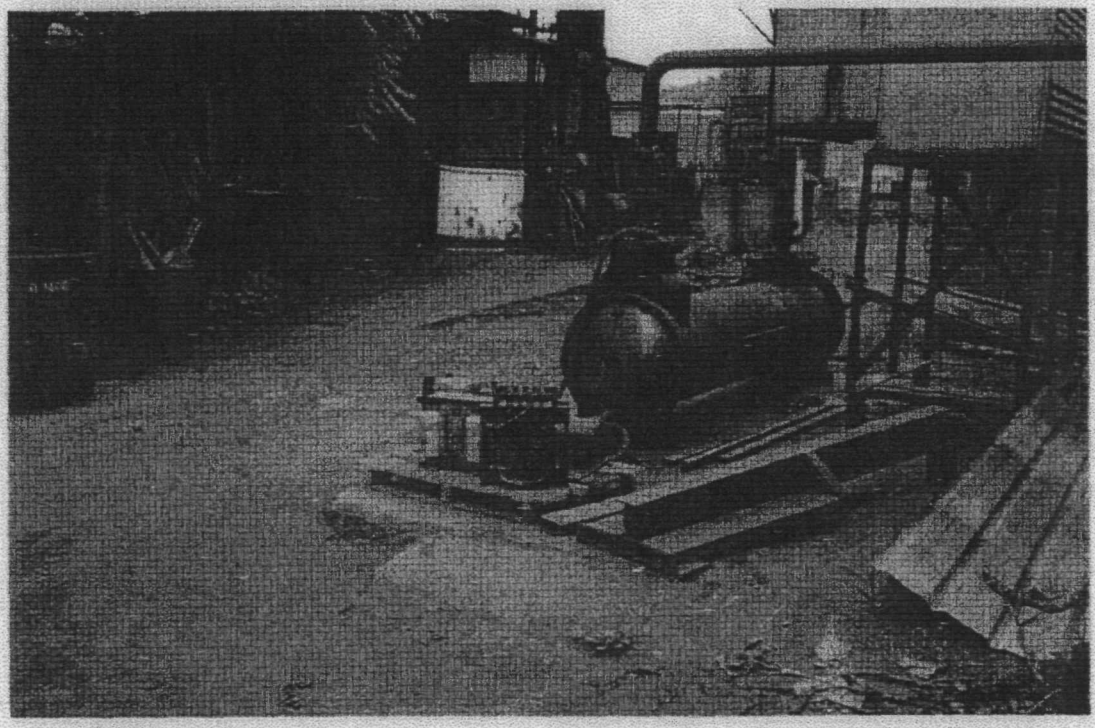


Photo No: 27 **Photo Date: 6/5/00**

Looking southeast in western portion of Columbia Forge operations yard.

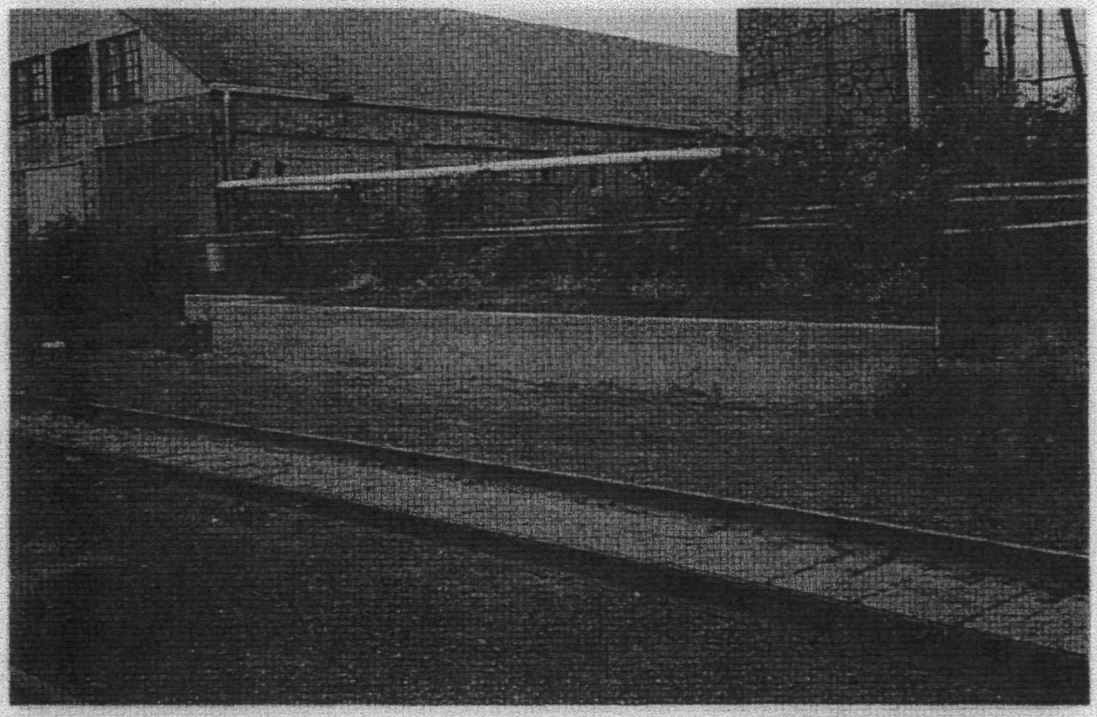


Photo No. 28 **Photo Date: 6/5/00**

Looking northwest at sand filter/retention box at south end of Columbia Forge operations yard.

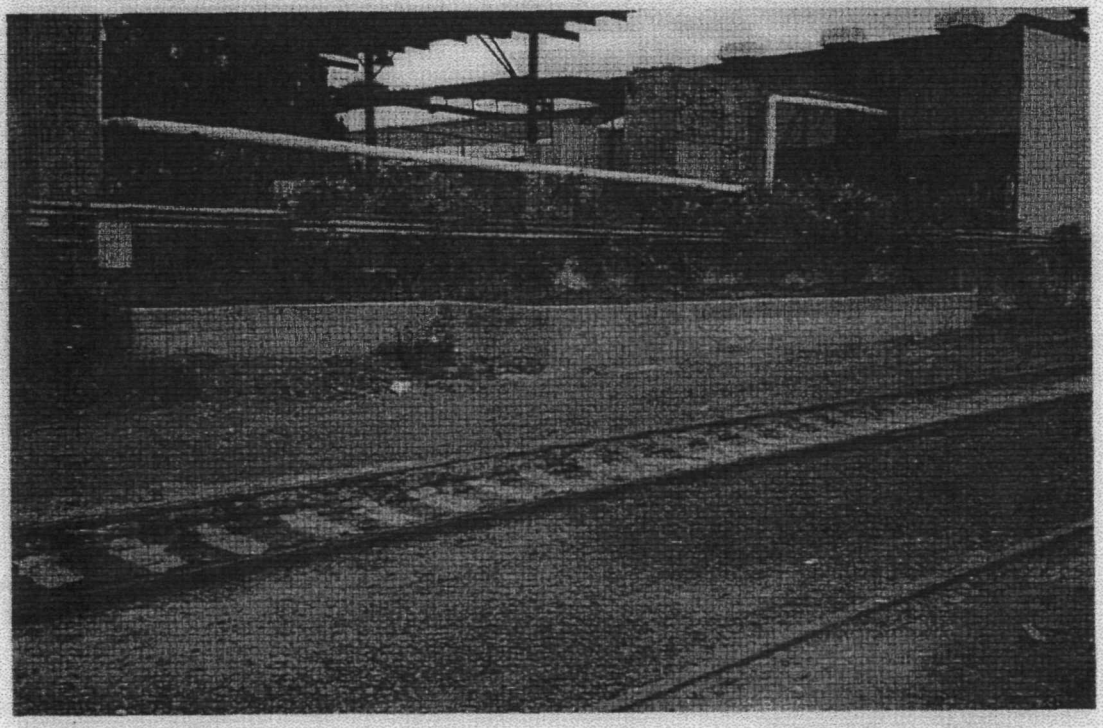


Photo No: 29 **Photo Date: 6/5/00**

Looking northeast at sand filter/retention box at south end of Columbia Forge operations yard.

Appendix B

APPENDIX B

REPRESENTATIVE MATERIAL DATA SHEETS

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL
P.O. BOX 17339
PORTLAND, OREGON 97217
(503)286-1673

CHRISTENSON OIL MSDS AMP140

CHEMTREC 800-424-9300

PRODUCT CODE NO: NONE

SECTION 1 - IDENTIFICATION

PRODUCT	:	AERO MP GEAR OIL SAE 140
SYNONYMS	:	
CHEMICAL	:	PETROLEUM HYDROCARBONS
CAS NO.	:	MIXTURE - NO SINGLE CAS NUMBER APPLICABLE
SARA HAZARD	:	NONE NOTED (SECTION 311/312) TITLE III SECTION 313 - LISTED

SECTION II - INGREDIENTS AND HAZARD CLASSIFICATION

COMPOSITION	%	PEL/TLV	HAZARD
MULTI-PURPOSE GEAR OIL SAE 80-90	100	NONE/NONE	NONE NOTED

SECTION III - HEALTH INFORMATION

INHALATION: THE ESTIMATED LC50 FOR A 1 HOUR EXPOSURE TO A SIMILAR COMPONENT OF THIS FORMULATION WAS 4.68 MG/L (RATS), WHICH IS CONSIDERED TOXIC. IN ORDER TO DETERMINE THE LC50 VALUE, EXTREMELY HEAVY MIST OF TEST MATERIAL WERE REQUIRED. THE VERY HEAVY MISTS AT THE NECESSARY CONCENTRATION MADE VISIBILITY DIFFICULT AND WOULD BE DIFFICULT TO WORK IN FOR ANY PERIOD OF TIME. THE AUTHOR REPORTED THAT HISTOPATHOLOGICAL CHANGES MAY HAVE BEEN A RESPONSE TO A PHYSICAL INSULT RATHER THAN A SPECIFIC COMPOUND RELATED TOXICITY EFFECT AND THAT THE TEST MATERIAL MAY BE CONSIDERED NON-HAZARDOUS FOR ALL PRACTICAL PURPOSES BY INHALATION.

INGESTION: FOR A SIMILAR COMPONENT OF THIS FORMULATION THE ACUTE ORAL LD50 VALUE WAS FOUND TO BE GREATER THAN 5.0 G/KG IN MALE AND FEMALE SPRAGUE-DAWLEY RATS. THE MATERIAL IS NOT CLASSIFIED AS TOXIC BY ORAL ADMINISTRATION AS DEFINED IN 16 CFR 1500.

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL
PO BOX 17339
PORTLAND, OREGON 97217
(503)286-1673

EYE CONTACT: THE PRODUCT IS NOT CLASSIFIED AS AN IRRITANT BY OCULAR APPLICATION. THE EYES OF NONE OF THE SIX NEW ZEALAND WHITE RABBITS WERE FOUND TO SHOW EVIDENCE OF POSITIVE CORNEAL, IRIS OR CONJUNCTIVAL CHANGES.
FOR A SIMILAR COMPONENT OF THIS FORMULATION THE EYES OF 6 RABBITS WERE FOUND TO SHOW EVIDENCE OF CONJUNCTIVAL CHANGES. IRRITATION SCORES IN INDIVIDUAL RABBITS RANGED FROM 0-4 (SCALE 0-110). THE MATERIAL IS NOT CLASSIFIED AS AN IRRITANT BY OCULAR APPLICATION AS DEFINED BY 16 CFR 1500.

SKIN CONTACT: THE PRIMARY IRRITATION INDEX WAS FOUND TO BE 2.1 BASED ON ERYTHEMA AND EDEMA. NO EVIDENCE OF TISSUE DAMAGE (CORROSION) WAS FOUND. THE MATERIAL IS NOT CLASSIFIED AS A PRIMARY IRRITANT OR AS A CORROSIVE BY DERMAL APPLICATION.
FOR A SIMILAR COMPETENT OF THIS FORMULATION THE PRIMARY IRRITATION INDEX WAS FOUND TO BE 0.5 (SCALE 0-8) BASE ON ERYTHEMA AND EDEMA. NO EVIDENCE OF TISSUE DAMAGE WAS FOUND. THE MATERIAL IS NOT CLASSIFIED AS A PRIMARY IRRITANT OR AS A CORROSIVE BY DERMAL APPLICATION AS DEFINED BY 16 CFR 1500.

SECTION IV - OCCUPATIONAL EXPOSURE LIMITS

PEL: TWA: 5MG/M3(OIL MIST)

PEL: TWA: 6MG/M3; STEL: 10 MG/M3 (OIL MIST)

SECTION V - EMERGENCY FIRST AID PROCEDURE

FOR OVEREXPOSURE BY SWALLOWING: DO NOT INDUCE VOMITING. IF VICTIM IS CONSCIOUS AND ABLE TO SWALLOW, PROMPTLY HAVE VICTIM DRINK WATER TO DILUTE. DO NOT GIVE SODIUM BICARBONATE, FRUIT JUICES OR VINEGAR. NEVER GIVE ANYTHING BY MOUTH IF THE VICTIM IS UNCONSCIOUS OR HAVING CONVULSIONS. CALL A PHYSICIAN OR POISON CONTROL CENTER IMMEDIATELY.

FOR OVEREXPOSURE BY SKIN CONTACT: WASH AFFECTED AREA.

FOR OVEREXPOSURE BY EYE CONTACT: IMMEDIATELY FLUSH EYES WITH PLENTY OF COOL WATER FOR AT LEAST 15 MINUTES. DO NOT LET VICTIM RUB EYES.

FOR OVEREXPOSURE BY INHALATION: IMMEDIATELY REMOVE VICTIM TO FRESH AIR. IF VICTIM HAS STOPPED BREATHING GIVE ARTIFICIAL RESPIRATION, PREFERABLY BY MOUTH - TO - MOUTH. GET MEDICAL ATTENTION IMMEDIATELY.

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL
P.O. BOX 17339
PORTLAND, OREGON 97217
(503)286-1673

PRODUCT CODE NO.: NONE

SECTION VI - PHYSICAL DATA

BOILING POINT:	NOT DETERMINED
MELTING POINT:	NOT DETERMINED
VAPOR PRESSURE:	NOT DETERMINED
SPECIFIC GRAVITY:	0.91 AT 60/60 DEG F
SOLUBILITY IN WATER:	NEGLIGIBLE
APPEARANCE AND COLOR:	DARK COLORED LIQUID WITH A PUNGENT ODOR

SECTION VII - FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 400 °F (204°C) ASTM D-92
AUTO-IGNITION TEMPERATURE: 650 °F
FLAMMABLE LIMITS IN AIR, % BY VOL. LOWER: NOT DETERMINED
FLAMMABLE LIMITS IN AIR, % BY VOL. UPPER: NOT DETERMINED
NFPA RATING: NO NFPA RATING
HMIS RATING: HEALTH (1) FIRE (1) REACTIVITY (0)
SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS

(INDIVIDUALS SHOULD PERFORM ONLY THOSE FIRE FIGHTING PROCEDURES FOR WHICH THEY HAVE BEEN TRAINED). USE WATER SPRAY, DRY CHEMICAL, FOAM OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE BUT SHOULD BE USED TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A SPILL OR LEAK HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM FIRE.

UNUSUAL FIRE & EXPLOSION HAZARDS

FIREFIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS IN THE POSITIVE-PRESSURE MODE WITH A FULL FACEPIECE WHEN THERE IS A POSSIBILITY OF EXPOSURE TO SMOKE, FUMES OR HAZARDOUS DECOMPOSITION PRODUCTS.

SECTION VIII - REACTIVITY

STABILITY:

GENERALLY STABLE

HAZARDOUS POLYMERIZATION:

NOT LIKELY

CONDITIONS & MATERIALS TO AVOID:

AVOID HEATING TO DECOMPOSITION.
THE USER IS ADVISED TO HAVE A SAFETY EXPERT EVALUATE THE SPECIFIC CONDITIONS OF USE.

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL
P.O. BOX 17339
PORTLAND, OREGON 97217
(503)286-1673

PRODUCT CODE NO.: NONE

HAZARDOUS DECOMPOSITION PRODUCTS:
DECOMPOSITION MAY PRODUCE CARBON MONOXIDE, CARBON DIOXIDE AND OXIDES OF NITROGEN, PHOSPHORUS AND SULFUR.

SECTION IX - EMPLOYEE PROTECTION

CONTROL MEASURES:
HANDLE IN THE PRESENCE OF ADEQUATE VENTILATION.

RESPIRATORY PROTECTION:
WHERE EXPOSURE IS LIKELY TO EXCEED ACCEPTABLE CRITERIA (SEE SECTIONS II AND IV), USE NIOSH/OSHA APPROVED RESPIRATORY EQUIPMENT. RESPIRATORS SHOULD BE SELECTED BASED ON THE FORM AND CONCENTRATION OF CONTAMINANT IN AIR AND ACCORDANCE WITH OSHA (29 CFR 1910.134).

PROTECTIVE CLOTHING:
WEAR GLOVES AND PROTECTIVE CLOTHING WHICH ARE IMPERVIOUS TO THE PRODUCT FOR THE DURATION OF ANTICIPATED EXPOSURE IF THERE IS A POTENTIAL FOR PROLONGED OR REPEATED SKIN CONTACT.

EYE PROTECTION:
WEAR SAFETY GLASSES MEETING THE SPECIFICATIONS OF ANSI STANDARD Z87.1

SECTION X - ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:
AVOID UNCONTROLLED RELEASES OF THIS MATERIAL. WHERE SPILLS ARE POSSIBLE, A COMPREHENSIVE SPILL RESPONSE PLAN SHOULD BE DEVELOPED AND IMPLEMENTED.

SPILL OR LEAK PRECAUTIONS:
WEAR APPROPRIATE RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING AS DESCRIBED IN SECTION IX. CONTAIN SPILLED MATERIAL. TRANSFER TO SECURE CONTAINERS. WHERE NECESSARY, COLLECT USING ABSORBENT MEDIA. IN THE EVENT OF AN UNCONTROLLED RELEASE OF THIS MATERIAL, THE USER SHOULD DETERMINE IF THE RELEASE IS REPORTABLE UNDER APPLICABLE LAWS AND REGULATION.

WATER DISPOSAL:
ALL RECOVERED MATERIAL SHOULD BE PACKAGED, LABELED, TRANSPORTED AND DISPOSED OR RECLAIMED IN CONFORMANCE WITH APPLICABLE LAWS AND REGULATIONS AND IN CONFORMANCE WITH GOOD ENGINEERING PRACTICES. AVOID LANDFILLING OF LIQUIDS. RECLAIM WHERE POSSIBLE.

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL
P.O. BOX 17339
PORTLAND, OREGON 97217
(503)286-1673

CHRISTENSON OIL MSDS #AMP140

PRODUCT CODE NO.: NONE

SECTION XI- REGULATORY CONTROLS

DEPARTMENT OF TRANSPORTATION:
DOT CLASSIFICATION: NOT REGULATED
DOT PROPER SHIPPING NAME:
OTHER DOT INFORMATION:

OTHER REGULATORY REQUIREMENTS:
LISTED IN TSCA INVENTORY

SECTION XII - PRECAUTIONS: HANDLING, STORAGE AND USAGE

NO SPECIAL PRECAUTIONS NECESSARY.

The information presented herein is believed to be factual as it has been derived from the works and opinions of persons believed to be qualified experts; however, nothing contained in this information is to be taken as a warranty or representation for which Christenson Oil bears legal responsibility. The user should review any recommendations in the specific context of the intended use to determine whether they are appropriate.

ISSUE DATE: January 17, 1994

SUPERSEDES:

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL
P.O. BOX 17339
PORTLAND, OREGON 97217
(503)286-1673

CHRISTENSON OIL MSDS #DWO68

PRODUCT CODE NO.: NONE

MANUFACTURER:	TRANSPORTATION EMERGENCIES:
CHRISTENSON OIL 3747 N. SUTTLE RD. P.O. BOX 17339 PORTLAND, OREGON 97217 CONTACT FOR FURTHER INFORMATION: CALL (503) 286-1673	CALL CHEMTREC (800) 424-9300 CONTINENTAL U.S.

PRODUCT IDENTIFICATION

PRODUCT NAME	:	DUREX HEAVY DUTY WAY OIL 68
SYNONYMS	:	WAY OIL
GENERIC NAME	:	WAY OIL 68
CHEMICAL FAMILY	:	PETROLEUM HYDROCARBON; INDUSTRIAL OILS
DOT PROPER SHIPPING	:	NOT DOT REGULATED
ID NUMBER	:	NONE

ACUTE HEALTH	FIRE	REACTIVITY	HAZARD RATING				
1	1	0		LEAST	-0	SLIGHT	-1
				MODERATE	-2	HIGH	-3
				EXTREME	-4		

SECTION I - INGREDIENTS

NO.	COMPOSITION	CAS NUMBER	PERCENT

P	DUREX HEAVY DUTY WAY OIL 68	MIXTURE	100
1	PETROLEUM BASESTOCK	64742-18-3	0-100
2	PETROLEUM BASESTOCK	64742-70-7	0-100
3	POLYMERIC ADDITIVE	MIXTURE	0-1
4	WAY OIL ADDITIVE	MIXTURE	0-10

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL MSDS#DWO68

SECTION I-B - ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTEDERMAL LD 50	ACUTE INHALAITON LC50
P	NOT AVAILABLE		

SECTION II - EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT:
Flush with water for 15 minutes while holding eyelids open. Get medical attention.

SKIN CONTACT:
Remove contaminated clothing and wipe excess off. Wash with soap and water or a waterless hand cleaner followed by soap and water. If irritation occurs, get medical attention.

INHALATION (BREATHING):
Remove victim to fresh air and provide oxygen if breathing is difficult. Get medical attention.

INGESTION (SWALLOWING):
Do not induce vomiting. In general, no treatment is necessary unless large quantities of prouct are ingested. However, get medical advice.

NOTE TO PHYSICIAN:
In general, emesis induction is unnecessary in high viscosity, low volatility products, i.e., most oils and greases.

SECTION III - OCCUPATIONAL EXPOSURE LIMITS

OSHA ACGIH

NO.	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	OTHER
P	5MG/M3*	NONE	5MG/MG*	10MG/M3*	N/AV

OTE:
* Oil mist, mineral oil.

MATERIAL SAFETY DATA SHEET

CHRISTENSON OIL MSDS#DWO68

HEALTH INFORMAITON

The health effects noted below are consistent with requirements under the OSHA Hazard Communication Standard (29 CFR 1910.1200)

EYE CONTACT
Lubricating oils are generally considered no more than mildly irritating to the eyes.

SKIN CONTACT
Lubricating oils are generally considered no more than mildly irritating to the skin. Prolonged and repeated contact may lead to various skin disorders such as dermatitis, oil acne or folliculitis.

INHALATION
Inhalation of vapors (generator at high temperatures only)or oil mist from this product may cause minor irritation of the mucous membrandes of the upper respiratory tract.

INGESTION
Lubricating oils are generally considered no more than slightly toxic if swallowed.

SIGNS AND SYPMTOMS
Irritation as noted above.

AGGRAVATED MEDICAL CONDITIONS
Pre-existing skin and respiratory disorders may be aggravated by exposure to this product.

OTHER HEALTH EFFECTS

SEE SECTION V FOR ADDITIONAL HEALTH INFORMATION.

SECTION IV - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:
If exposure may or does exceed occupational exposure limits use an NIOSH approved respirator to prevent overexposure. In accordance with 29 CFR 1910.134 use either an atmosphere-aupplying respirator or an air-purifying respirator for organic vapor.

ROTECTION CLOTHING

The use of gloves impermeable to the specific material handled is advised to prevent skin contact and possible irritation.

MATERIAL SAFETY DATA SHEETS

SECTION V - REACTIVITY DATA

STABILITY: STABLE

CONDITIONS AND MATERIALS TO AVOID:

Avoid heat, open flames and oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS

Smoke, carbon monoxide, aldehydes and other products of incomplete combustion.

SECTION - FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD:
410 DEF F (COC)

FLAMMABLE LIMITS / % VOLUME IN AIR
LOWER: N/AV UPPER: N/AV

EXTINGUISHING DATA

Use water fog, foam, dry chemical or CO^2. Do not use a direct stream of water. Product will float and can be reignited on surface of water.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS

Material will not burn unless preheated

DOT FLAMMABILITY
CLASSIFICATION
NOT REGULATED 381F (COC)

EXTINGUISHING MEDIA:

EXTINGUISH WITH DRY CHEMICAL, CO_2, WATER SPRAY, FOAM, SAND OR EARTH. WATER AND FOAM MAY CAUSE FROTHING.

FIRE & EXPLOSION HAZARDS:

THIS MATERIAL WILL BURN, BUT WILL NOT IGNITE READILY.

FIRE FIGHTING PROCEDURES:

WATER SPRAY MAY BE USEFUL IN MINIMIZING VAPORS AND COOLING CONTAINER EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSE. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF YOU CAN DO SO WITHOUT RISK.

MATERIAL SAFETY DATA SHEET

SECTION IX - PHYSICAL DATA

APPROX BOILING POINT	VAPOR DENSITY	EVAPORATION RATE	% VOLATILE
+600F (316C)	HEAVIER THAN AIR	SLOWER THAN ETHER	NEGLIGIBLE

% SOLUBILITY IN WATER	SPECIFIC GRAVITY	APPEARANCE	ODOR
NEGLIGIBLE	N/A	CLEAR, BROWN LIQUID	CHARACTERISTIC

SECTION X - PRECAUTIONARY LABEL

CAUTION! USED MOTOR OIL IS A POSSIBLE SKIN CANCER HAZARD BASED ON TEST WITH LABORATORY ANIMALS. AVOID PROLONGED OR REPEATED SKIN CONTACT. AVOID MAKING OR BREATHING OIL MIST. USE ADEQUATE VENTILATION. WASH THOROUGHLY WITH SOAP AND WATER AFTER HANDLING.

SECTION XI - DOCUMENTARY INFORMATION

ISSUE DATE	:	July 17, 1995	PRODUCT CODE NO.	:	NONE
MSDS NO.	:	DWO68	PREV. PROD. CODE NO.	:	DWO68
			PREV. MSDS NO.	:	NONE

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.

This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

[illegible]

MATERIAL SAFETY DATA SHEET

VALVOLINE OIL COMPANY
DIVISION OF ASHLAND OIL, INC.
P.O. BOX 391
ASHLAND, KENTUCKY 41114
(606) 329-3333

24-HOUR EMERGENCY TELEPHONE (606) 324-1133

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

PRODUCT NAME: VAL-PLEX EP
CAS NUMBER: TS LIST

CHRISTENSON OIL CO
[illegible] NW ST HELENS RD
PORTLAND OR 97210
ATTN: PLANT MGR / SAFETY DIR.

[illegible]
DATA SHEET NO: [illegible]
LATEST REVISION DATE: [illegible]
PRODUCT: [illegible]
INVOICE: [illegible]
INVOICE DATE: [illegible]
TO:

SECTION I-PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID: PETROLEUM GREASE

DOT HAZARD CLASSIFICATION: NOT APPLICABLE

SECTION II-COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS ARE IDENTIFIED IN THIS SECTION
SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT	% (BY WT)	NOTE
LUBRICATING GREASE * CAS #: TS LIST - -	100	(1)

(1): PEL/TLV NOT ESTABLISHED FOR THIS MATERIAL

* THE SPECIFIC CHEMICAL IDENTITY HAS BEEN WITHHELD AS A TRADE SECRET.

SECTION III-PHYSICAL DATA

PROPERTY	REFINEMENT	MEASUREMENT
BOILING POINT	FOR PRODUCT	> 700.00 DEG F (371.11 DEG C) @ 760.00 MMHG
VAPOR PRESSURE	NOT APPLICABLE	
SPECIFIC VAPOR DENSITY	NOT APPLICABLE	
SPECIFIC GRAVITY		.950 @ 60.00 DEG F (15.56 DEG C)
PERCENT VOLATILES	NOT APPLICABLE	
EVAPORATION RATE	NOT APPLICABLE	

SECTION IV-FIRE AND EXPLOSION INFORMATION

FLASH POINT(D-92) >450.0 DEG F (232.2 DEG C)

EXPLOSIVE LIMIT NOT APPLICABLE

EXTINGUISHING MEDIA: REGULAR FOAM OR CARBON DIOXIDE OR DRY CHEMICAL

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS

FIREFIGHTING PROCEDURES: WATER OR FOAM MAY CAUSE FROTHING WHICH CAN BE VIOLENT AND POSSIBLY ENDANGER THE LIFE OF THE FIREFIGHTER, ESPECIALLY IF SPRAYED INTO CONTAINERS OF HOT, BURNING LIQUID.

WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

NFPA CODES: HEALTH- 1 FLAMMABILITY- 1 REACTIVITY- 0

SECTION V-HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL: SEE SECTION II

EFFECTS OF ACUTE OVEREXPOSURE: FOR COMPONENT

EYES - CAN CAUSE IRRITATION.
SKIN - MAY CAUSE IRRITATION.
BREATHING - NONE CURRENTLY KNOWN.
SWALLOWING - CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, AND DIARRHEA.

FIRST AID:

[illegible]

MATERIAL SAFETY DATA SHEET

VALVOLINE OIL COMPANY
DIVISION OF ASHLAND OIL, INC.
P.O. BOX 391
ASHLAND, KENTUCKY 41114
(606) 329-3333

24-HOUR EMERGENCY TELEPHONE
(606) 324-1133

SECTION V-HEALTH HAZARD DATA (CONTINUED)

IF ON SKIN: THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

IF IN EYES: FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY. GET MEDICAL ATTENTION.

IF SWALLOWED: IMMEDIATELY DRINK TWO GLASSES OF WATER AND INDUCE VOMITING BY EITHER GIVING IPECAC SYRUP OR BY PLACING FINGER AT BACK OF THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

IF BREATHED: REMOVE INDIVIDUAL TO FRESH AIR.

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: AVOID CONTACT WITH:, STRONG OXIDIZING AGENTS.

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: SWEEP UP MATERIAL ONTO PAPER.

LARGE SPILL: SHOVEL MATERIAL INTO CONTAINERS. THOROUGHLY SWEEP AREA OF SPILL TO CLEAN UP ANY RESIDUAL MATERIAL.

WASTE DISPOSAL METHOD:

SMALL SPILL: DEPOSIT IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

LARGE SPILL: DEPOSIT IN A LANDFILL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: IF TLV OF THE PRODUCT OR ANY COMPONENT IS EXCEEDED, A NIOSH/MSHA JOINTLY APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS UNDER SPECIFIED CONDITIONS. (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS:, NEOPRENE

EYE PROTECTION: WEAR SAFETY GLASSES IN COMPLIANCE WITH OSHA REGULATIONS. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

OTHER PROTECTIVE EQUIPMENT: NORMAL WORK CLOTHING COVERING ARMS AND LEGS.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THIS DATASHEET MUST BE OBSERVED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

MATERIAL SAFETY DATA SHEET

MERIT OIL & REFINING, INC.
4150 N. Suttle Rd.
Portland, OR 97217
(503) 286-4755

PRODUCT CODE NO.: MOHO

MANUFACTURER:

MERIT OIL & REFINING, INC.
4150 N. Suttle Rd.
Portland, OR 97217

CONTACT FOR FURTHER INFORMATION:

Call in Oregon (503) 286-4755
Transportation Emergencies: CALL CHEMTREC (800)424-9300

PRODUCT IDENTIFICATION:

PRODUCT NAME	: MERIT HYDRAULIC OIL
SYNONYMS	: MERIT HYDRAULIC OIL
GENERIC NAME	: HYDRAULIC OIL
CHEMICAL FAMILY	: PETROLEUM HYDROCARBON
DOT PROPER SHIPPING NAME	: NOT APPLICABLE
ID NUMBER	: NONE

SECTION I: INGREDIENTS	TLV	UNITS	AGENCY	TYPE
OIL MIST, IF GENERATED	5.00	MG/M3	OSHA	FULL TERM TWA

THE IDENTITIES OF INGREDIENTS THAT ARE TRADE SECRETS ARE EXCLUDED FROM THIS LIST.

SECTION II. EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT:
** FOR DIRECT CONTACT. FLUSH THE AFFECTED EYE(S) WITH CLEAN WATER. IF IRRITATION OR REDNESS DEVELOPS, SEEK MEDICAL ATTENTION.

SKIN CONTACT:
** DO NOT USE GASOLINES. THINNERS OR SOLVENTS TO REMOVE PRODUCT FROM SKIN. WIPE MATERIAL FROM SKIN AND REMOVE CONTAMINATED CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH SOAP AND WATER AND, IF NECESSARY, A WATERLESS SKIN CLEANSER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING)
**IF IRRITATION OF NOSE OR THROAT DEVELOPS, MOVE AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING OR IF BREATHING DIFFICULTIES DEVELOP, ARTIFICIAL RESPIRATION OF OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

MATERIAL SAFETY AND DATA SHEET

PRODUCT CODE NO. : MOHO

INGESTION (SWALLOWING):
IF VICTIM IS CONSCIOUS AND ALERT, GIVE 2 TO 3 CUPS OF MILK OR WATER TO DRINK. SEEK MEDICAL ATTENTION. TO PHYSICIAN: EMESIS OR LAVAGE IS NOT RECOMMENDED FOR INGESTIONS OF MINUTE QUANTITIES OR TASTES OF MOST HYDROCARBONS. MEDICAL OPINION IS DIVIDED FOR LARGER INGESTIONS. EMESIS OR LAVAGE HAS BEEN RECOMMENDED FOR THOSE PETROLEUM PRODUCTS WHICH HAVE A HIGH ORAL TOXICITY. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IS RECOMMENDED BY SOME PHYSICIANS TO PREVENT ASPIRATION.

SECTION III: POTENTIAL ADVERSE HEALTH EFFECTS

EYE CONTACT:
THIS MATERIAL MAY CAUSE EYE IRRITATION. DIRECT CONTACT MAY CAUSE BURNING, TEARING AND REDNESS.

SKIN CONTACT:
THIS MATERIAL MAY CAUSE SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING AND DERMATITIS.

INHALATION (BREATHING)
EXPOSURE TO MISTS, OR PROLONGED OR REPEATED EXPOSURE TO FUMES OR VAPORS THAT MAY BE GENERATED WHEN THIS MATERIAL IS HEATED, MAY CAUSE IRRITATION OF NOSE AND THROAT.

INGESTION (SWALLOWING)
ACCIDENTAL INGESTION OF THIS MATERIAL MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT.

COMMENTS:
USED MOTOR OIL: FOLLOWING REPEATED SKIN APPLICATIONS, ANIMAL STUDIES HAVE SHOWN THAT USED MOTOR/CRANKCASE OILS HAVE CAUSED AN INCREASED INCIDENCE OF SKIN CANCER IN MICE. IT IS THEREFORE RECOMMENDED THAT PROLONGED OR REPEATED CONTACT WITH MOTOR/CRANKCASE OILS BE AVOIDED.

SECTION IV: SPECIAL PROTECTION INFORMATION

VENTILATION:
IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE IN MAINTAINING AIRBORNE CONCENTRATIONS BELOW THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I), ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED.

RESPIRATORY PROTECTION:
IF AIRBORNE CONCENTRATIONS EXCEED RECOMMENDED EXPOSURE LIMITS, A SUITABLE FILTER-TYPE RESPIRATOR SHOULD BE WORN. (SEE SECTION I.)

PROTECTIVE GLOVES:
THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:
APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

MATERIAL SAFETY AND DATA SHEET
PAGE 3 OF 4

PRODUCT CODE NO. : MOHO

OTHER PROTECTIVE EQUIPMENT:
IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN WORK AREA FOR FLUSHING EYES AND SKIN. BARRIER CREAMS THAT ARE SPECIFIC FOR OIL-BASED MATERIAL ARE RECOMMENDED WHEN GLOVES ARE IMPRACTICAL.

SECTION V: REACTIVITY DATA

STABILITY:
STABLE

INCOMPATIBILITY (MATERIALS TO AVOID):
AVOID CONTACT WITH STRONG OXIDIZING AGENTS. EXTENDED EXPOSURE TO HIGH TEMPERATURES MAY CAUSE DECOMPOSITION.

HAZARDOUS DECOMPOSTION PRODUCTS:
THERMAL DECOMPOSITION IN THE PRESENCE OF AIR MAY YIELD MAJOR AMOUNTS OF OXIDES OF CARBON AND MINOR AMOUNTS OF OXIDES OF NITROGEN, PHOSPHORUS, SULFUR AND ZINC.

HAZARDOUS POLYMERIZATION:
WILL NOT OCCUR.

SECTION VI: SPILL OF LEAK PROCEDURES
(HIGHWAY OR RAILWAY SPILLS, CALL CHEMTREC 800-424-9300 IN CONT. US)

PRECAUTIONS IN CASE OF RELEASE OR SPILL:
COLLECT LEAKING LIQUID IN SEALABLE CANTAINERS. ABSORB SPILLED LIQUID IN SAND OR INERT ABSORBANT. CONTACT FIRE AUTHORITIES AND APPROPRIATE STATE/LOCAL AGENCIES. IF SPILL OF ANY AMOUNT IS MADE INTO OR UPON U.S. NAVIGABLE WATERS, THE CONTIGUOUS ZONE, OR ADJOINING SHORELINES, NOTIFY COAST GUARD NATIONAL RESPONSE CENTER (PHONE NUMBER 800-424-8802).

WASTE DISPOSAL METHOD:
DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII: STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:
STORE IN A COOL, DRY LOCATION. KEEP AWAY FROM INCOMPATIBLE MATERIALS (SEE SECTION V). AVOID GENERATING OIL MISTS WHILE HANDLING. AVOID PROLONGED OR REPEATED SKIN CONTACT. WASH THOROUGHLY AFTER HANDLING. FOR USED MOTOR OIL: LAUNDER SATURATED CLOTHING BEFORE WEARING AND DISCARD OIL-SOAKED SHOES AND UNWASHABLE CLOTHING.

SECTION VIII: FIRE AND EXPLOSION HAZARD DATA

HAZARD RANKING
(0= LEAST, 1= SLIGHT, 2= MODERATE, 3= HIGH, 4= EXTREME)

NFPA HAZARD CLASS:
HEALTH HAZARD: 0.
FLAMMABILITY: 1
REACTIZITY: 0.
OTHER: NONE

PRODUCT CODE NO.: MOHO

DOT FLAMMABILITY CLASSIFICATION: NOT REGULATED
FLASH POINT: 390-400, COC F

EXTINGUISHING MEDIA:
EXTINGUISH WITH DRY CHEMICAL, CO2, WATER SPRAY, FOAM, SAND OR EARTH. WATER AND FOAM MAY CAUSE FROTHING.

FIRE & EXPLOSION HAZARDS:
THIS MATERIAL WILL BURN, BUT WILL NOT IGNITE READILY.

FIRE FIGHTING PROCEDURES:
WATER SPRAY MAY BE USEFUL IN MINIMIZING VAPORS AND COOLING CONTAINERS EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF YOU CAN DO SO WITHOUT RISK.

SECTION IX: PHYSICAL DATA

APPROX BOILING POINT	VAPOR DENSITY	EVAPORATION RATE	% VOLITILE
ABOVE 600 F (316 C)	HEAVIER THAN AIR	SLOWER THAN ETHER	NEGLIGIBLE

% SOLUBILITY IN WATER	SPECIFIC GRAVITY	APPEARANCE	ODOR
NEGLIGIBLE	0.89-0.91	CLEAR BROWN LIQUID	CHARACTERISTIC

SECTION X: PRECAUTIONARY LABEL

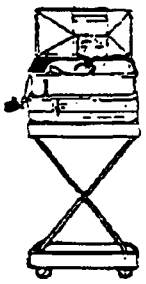
CAUTION: USED MOTOR OIL IS A POSSIBLE SKIN CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS. AVOID PROLONGED OR REPEATED SKIN CONTACT. AVOID MAKING OR BREATHING OIL MIST. USE ADEQUATE VENTILATION. WASH THOROUGHLY WITH SOAP AND WATER AFTER HANDLING.

SECTION XI: DOCUMENTARY INFORMATION

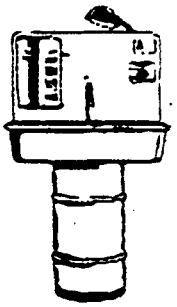
ISSUE DATE: Jan. 26, 1993 PRODUCT CODE NUMBER.: MOHO

RECYCLED SOLVENT USED AT COLUMBIA FORGE

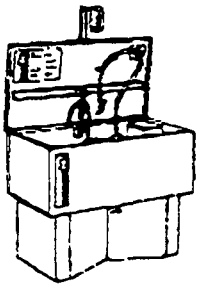
safety-kleen®



Model 14 & 60



Model 16 & 30



Model 34 & 44, COMS, and other

Material Safety Data Sheet

Safety-Kleen 105 Solvent

Part # 6617

SK 105 Solvent; Revision 12/90; Form Pan No. 82310

SAFETY-KLEEN 105 SOLVENT

MATERIAL SAFETY DATA SHEET FOR U.S.A. AND CANADA

SECTION I – PRODUCT INFORMATION

Safety-Kleen Corp. - 777 Big Timber Road - Elgin, IL, U.S.A. 60123
Safety-Kleen Canada Inc. - 3090 Blvd. Le Carrefour - Suite 300 - Chomedy Laval Quebec, Canada H7T 2J7
For Product Technical Information Call 312-694-2700 (U.S.A.);
800-363-2260 (Eastern Canada); 514-686-2040 (Western Provinces/Call Collect)

24-HOUR EMERGENCY TELEPHONE	*MEDICAL:*	*TRANSPORTATION:*
These numbers are for emergency use only. If you desire non-emergency information about this product, please call a telephone number listed above.	800-752-7869 (U.S.A.) 312-942-5969 (CANADA) RUSH POISON CONTROL CENTER CHICAGO, ILLINOIS, U.S.A.	708-588-4660 (U.S.A.) SAFETY-KLEEN ENVIRONMENT, HEALTH AND SAFETY DEPARTMENT 613-996-6666 (CANADA) CANUTEC

IDENTITY (TRADE NAME): SAFETY-KLEEN 105 SOLVENT

SYNONYMS: PETROLEUM DISTILLATES, PETROLEUM NAPHTHA, MINERAL SPIRITS, STODDARD SOLVENT

SK PART NUMBER: 6617

FAMILY/CHEMICAL NAME: HYDROCARBON SOLVENT

PRODUCT USAGE: SOLVENT FOR CLEANING AND DEGREASING PARTS

SECTION II – HAZARDOUS COMPONENTS

NAME	SYNONYM	Wt %	CAS NO.	OSHA PEL TWA (ppm)	OSHA PEL STEL (ppm)	ACGIH TLV TWA (ppm)	ACGIH TLV STEL (ppm)	LD50[a]	LC50[b]
Parts Washer Solvent (Consists predominantly of C9-C13 Saturated Hydrocarbons)	Mineral Spirits	85.0	64741-41-9	100 **	N.Av.	100 **	N.Av.	> 5000**	3400**
C8+ Aromatics		12.0	Mixture	N.Av.	N.Av.	N.Av.	N.Av.	N.Av.	N.Av.
*Toluene		0.5	108-88-3	100	150	100	150	5000	4000
*Xylene		1.0	1330-20-7	100	150	100	150	4300	5000
*Ethyl Benzene		0.5	100-41-4	100	125	100	125	3500	4000[c]
*1,1,1 Trichloroethane	Methyl Chloroform	0-0.5***	71-55-6	350	450	350	450	10300	18000
*Perchloroethylene	Tetrachloroethylene	0-0.5***	127-18-4	25	N.Av.	50	200	2629	4000[c]
Total Chlorinated Solvents		0-1.0***							

N.Av. = Not available.
* See Section X - Other Regulatory Information
**For Stoddard Solvent
***Even though the concentration range does not fall under the ranges prescribed by WHMIS, this is the actual range which varies with each batch of the product.

[a] Oral-Rat LD50 (mg/kg)
[b] Inhalation-Rat LC50 (ppm/4 hours)
[c] Inhalation-Rat LCLo (ppm/4 hours)

SECTION III -- PHYSICAL DATA

PHYSICAL STATE, APPEARANCE AND ODOR:	Combustible liquid, clear, green, with characteristic hydrocarbon odor.
ODOR THRESHOLD:	Not available.
BOILING POINT:	304-435°F (151-224°C).
VAPOR PRESSURE:	2 mm Hg at 68°F (20°C).
FREEZING POINT:	Not available.
EVAPORATION RATE:	0.1 (Butyl Acetate = 1).
VOLATILE:	99.9%
VOLATILE ORGANIC COMPOUNDS:	6.4 to 6.7 lbs/gal; 770 to 800 g/l
DENSITY:	Not available.
VAPOR DENSITY:	4.9 (Air = 1).
SOLUBILITY IN WATER:	Negligible.
pH:	Not applicable.
SPECIFIC GRAVITY:	0.77 to 0.80 at 60/60°F (16/16°C) (Water = 1).
COEFFICIENT OF WATER/OIL DISTRIBUTION:	Not available.
MOLECULAR WEIGHT:	142 (Approximately).

SECTION IV -- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	105°F (41°C) SETA
AUTOIGNITION TEMPERATURE:	473°F (245°C).
CONDITIONS OF FLAMMABILITY:	Materials must be moderately heated before ignition can occur.
FLAMMABLE LIMITS IN AIR:	*LOWER:* 0.7 Vol. % *UPPER:* 6.0 Vol. %
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Decomposition and combustion products may be toxic. Heated containers may rupture, explode or be thrown into the air. Vapors are heavier than air and may travel great distances to ignition source and flash back. Not sensitive to mechanical impact. Material may be sensitive to static discharge, which could result in fire or explosion.
EXTINGUISHING MEDIA:	Carbon dioxide, foam, dry chemical, water (mist only).
FIRE FIGHTING PROCEDURES -- SPECIAL:	NFPA 704 Rating 0-2-0 Keep storage containers cool with water spray. Use self-contained breathing apparatus (SCBA).
HAZARDOUS COMBUSTION PRODUCTS:	Thermal decomposition and burning may produce carbon monoxide.

INHALATION: (Breathing)	Remove to fresh air immediately. Use oxygen if there is difficulty breathing or artificial respiration if breathing has stopped. Do not leave victim unattended. Seek immediate medical attention if necessary.
INGESTION: (Swallowing)	If conscious, drink 4 to 8 ounces of water and seek immediate medical attention. DO NOT induce vomiting.

SECTION VIII – PRECAUTIONS FOR SAFE USE AND HANDLING AND PREVENTIVE MEASURES

SPILL PROCEDURES:	Remove all ignition sources. Ventilate area and avoid breathing vapors. For large spills, isolate area and deny entry. If possible, contain as a liquid for possible re-refining. Absorb with compatible absorbent material. Shovel into closable container for disposal. Wear protective equipment specified in Section IX. Contain away from surface waters and sewers.
WASTE DISPOSAL METHODS:	Dispose in accordance with Federal, State, Provincial and local regulations. Contact Safety-Kleen regarding recycling or proper disposal.
HANDLING PRECAUTIONS:	Avoid contact with eyes, skin or clothing. Use in well ventilated area and avoid breathing vapors or mists. Keep away from heat, sparks and flames.
SHIPPING AND STORING PRECAUTIONS:	Keep container tightly closed when not in use and during transport. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld, grind or expose containers to flame or other sources of ignition.
PERSONAL HYGIENE:	Use good personal hygiene. Wash thoroughly with soap and water after handling and before eating, drinking or using tobacco products. Launder contaminated clothing and clean protective equipment before reuse.

SECTION IX – CONTROL MEASURES AND OTHER PREVENTIVE MEASURES

EYE PROTECTION:	Where there is likelihood of spill or splash, wear chemical goggles and faceshield. Contact lenses should not be worn.
PROTECTIVE GLOVES:	Use nitrile or neoprene gloves to prevent contact with skin.
RESPIRATORY PROTECTION:	Use NIOSH/MSHA-approved respiratory protective equipment when concentration of vapors or mists exceeds applicable exposure limit. Depending on the airborne concentration, use a respirator or gas mask with appropriate cartridges and canisters. A self-contained breathing apparatus (SCBA) is required for large spills and emergencies. Selection and use of respiratory protective equipment should be in accordance in the U.S.A. with OSHA General Industry Standard 29 CFR 1910.134 and in Canada with CSA Standard Z94.4-M1982.
ENGINEERING CONTROLS:	Provide local exhaust or general dilution ventilation needed to maintain concentrations of vapors or mists below applicable exposure limits. Where explosive mixtures may be present, systems safe for such locations should be used.
OTHER PROTECTIVE EQUIPMENT:	Wear appropriate solvent-resistant boots, apron or other protective clothing where spills and splashes are possible. A source of clean water should be available in work areas for flushing the eyes and skin.

SECTION X – OTHER REGULATORY INFORMATION

DOT PROPER SHIPPING NAME:	PETROLEUM NAPHTHA
DOT CLASS:	COMBUSTIBLE LIQUID
DOT ID NUMBER:	UN1255

SARA TITLE III:

Product contains toxic chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372. Toxic constituents are listed with an asterisk in Section II of this Material Safety Data Sheet.

Product poses the following physical and/or health hazards as defined in 40 CFR 370.3 (Sections 311, 312 of SARA Title III):

Immediate (Acute) Health Hazard
Delayed (Chronic) Health Hazard
Fire Hazard

TDGA:

NAPHTHA, PETROLEUM
CLASS 3.3, UN1255, P.G. III

WHMIS CLASSIFICATION:

Class B3, Combustible Liquid;
Class D2A, Other Toxic Effects, Very Toxic Material;
Class D2B, Other Toxic Effects, Toxic Material

SECTION XI – PREPARATION INFORMATION

PREPARED BY: Product MSDS Coordinator *FORM PART NO.* 82310

ORIGINAL ISSUE DATE: July 20, 1989 *REVISED:* December 14, 1990 *SUPERSEDES:* March 12, 1990

MATERIAL SAFETY DATA SHEET

FUEL PROCESSORS INCORPORATED
P.O. Box 1407
Woodland, WA 98674
(503)-286-8352 (Oregon)
(206)-225-6571 (Washington)

PRODUCT CODE NO. : MOAEO

MANUFACTURER:
FUEL PROCESSORS INCORPORATED
P.O. Box 1407
Woodland, WA 98674

CONTACT FOR FURTHER INFORMATION:
Call in Oregon (503)-286-8352
Call in Washington (206)-225-6571

Transportation Emergencies:
CALL CHEMTREC at (800)-424-9300 in continental U.S.

PRODUCT IDENTIFICATION:

PRODUCT NAME	:	MERIT ALL ENGINE OIL 10 - 30
SYNONYMS	:	MERIT ALL ENGINE OIL
GENERIC NAME	:	CRANKCASE OIL
CHEMICAL FAMILY	:	PETROLEUM HYDROCARBON
DOT PROPER SHIPPING NAME	:	NOT APPLICABLE
ID NUMBER	:	NONE

SECTION I: INGREDIENTS

	TLV	UNITS	AGENCY	TYPE
OIL MIST, IF GENERATED	5.00	MG/M3	OSHA	FULL TERM TWA

THE IDENTITIES OF INGREDIENTS THAT ARE TRADE SECRETS ARE EXCLUDED FROM THIS LIST.

SECTION II: EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT:
FOR DIRECT CONTACT, FLUSH THE AFFECTED EYE(S) WITH CLEAN WATER. IF IRRITATION OR REDNESS DEVELOPS, SEEK MEDICAL ATTENTION.

SKIN CONTACT:
DO NOT USE GASOLINES, THINNERS OR SOLVENTS TO REMOVE PRODUCT FROM SKIN. WIPE MATERIAL FROM SKIN AND REMOVE CONTAMINATED CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH SOAP AND WATER AND, IF NECESSARY, A WATERLESS SKIN CLEANSER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING)
IF IRRITATION OF NOSE OR THROAT DEVELOPS, MOVE AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING OR IF BREATHING DIFFICULTIES DEVELOP, ARTIFICIAL RESPIRATION OF OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

PRODUCT CODE NO.: MOAEO

INGESTION (SWALLOWING):
IF VICTIM IS CONSCIOUS AND ALERT, GIVE 2 TO 3 CUPS OF MILK OR WATER TO DRINK. SEEK MEDICAL ATTENTION. TO PHYSICIAN: EMESIS OR LAVAGE IS NOT RECOMMENDED FOR INGESTIONS OF MINUTE QUANTITIES OR TASTES OF MOST HYDROCARBONS. MEDICAL OPINION IS DIVIDED FOR LARGER INGESTIONS. EMESIS OR LAVAGE HAS BEEN RECOMMENDED FOR THOSE PETROLEUM PRODUCTS WHICH HAVE A HIGH ORAL TOXICITY. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IS RECOMMENDED BY SOME PHYSICIANS TO PREVENT ASPIRATION.

SECTION III: POTENTIAL ADVERSE HEALTH EFFECTS

EYE CONTACT:
THIS MATERIAL MAY CAUSE EYE IRRITATION. DIRECT CONTACT MAY CAUSE BURNING, TEARING AND REDNESS.

SKIN CONTACT:
THIS MATERIAL MAY CAUSE SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING AND DERMATITIS.

INHALATION (BREATHING)
EXPOSURE TO MISTS, OR PROLONGED OR REPEATED EXPOSURE TO FUMES OR VAPORS THAT MAY BE GENERATED WHEN THIS MATERIAL IS HEATED, MAY CAUSE IRRITATION OF NOSE AND THROAT.

INGESTION (SWALLOWING)
ACCIDENTAL INGESTION OF THIS MATERIAL MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT.

COMMENTS:
USED MOTOR OIL: FOLLOWING REPEATED SKIN APPLICATIONS, ANIMAL STUDIES HAVE SHOWN THAT USED MOTOR/CRANKCASE OILS HAVE CAUSED AN INCREASED INCIDENCE OF SKIN CANCER IN MICE. IT IS THEREFORE RECOMMENDED THAT PROLONGED OR REPEATED CONTACT WITH MOTOR/CRANKCASE OILS BE AVOIDED.

SECTION IV: SPECIAL PROTECTION INFORMATION

VENTILATION:
IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE IN MAINTAINING AIRBORNE CONCENTRATIONS BELOW THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I), ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED.

RESPIRATORY PROTECTION:
IF AIRBORNE CONCENTRATIONS EXCEED RECOMMENDED EXPOSURE LIMITS, A SUITABLE FILTER-TYPE RESPIRATOR SHOULD BE WORN. (SEE SECTION I.)

PROTECTIVE GLOVES:
THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:
APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

MATERIAL SAFETY AND DATA SHEET

PRODUCT CODE NO.: MOAEO

OTHER PROTECTIVE EQUIPMENT:
IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN WORK AREA FOR FLUSHING EYES AND SKIN. BARRIER CREAMS THAT ARE SPECIFIC FOR OIL-BASED MATERIAL ARE RECOMMENDED WHEN GLOVES ARE IMPRACTICAL.

SECTION V: REACTIVITY DATA

STABILITY:
STABLE

INCOMPATIBILITY (MATERIALS TO AVOID):
AVOID CONTACT WITH STRONG OXIDIZING AGENTS. EXTENDED EXPOSURE TO HIGH TEMPERATURES MAY CAUSE DECOMPOSITION.

HAZARDOUS DECOMPOSTION PRODUCTS:
THERMAL DECOMPOSITION IN THE PRESENCE OF AIR MAY YIELD MAJOR AMOUNTS OF OXIDES OF CARBON AND MINOR AMOUNTS OF OXIDES OF NITROGEN, PHOSPHORUS, SULFUR AND ZINC.

HAZARDOUS POLYMERIZATION:
WILL NOT OCCUR.

SECTION VI: SPILL OF LEAK PROCEDURES
(HIGHWAY OR RAILWAY SPILLS, CALL CHEMTREC 800-424-9300 IN CONT. US)

PRECAUTIONS IN CASE OF RELEASE OR SPILL:
COLLECT LEAKING LIQUID IN SEALABLE CANTAINERS. ABSORB SPILLED LIQUID IN SAND OR INERT ABSORBANT. CONTACT FIRE AUTHORITIES AND APPROPRIATE STATE/LOCAL AGENCIES. IF SPILL OF ANY AMOUNT IS MADE INTO OR UPON U.S. NAVIGABLE WATERS, THE CONTIGUOUS ZONE, OR ADJOINING SHORELINES, NOTIFY COAST GUARD NATIONAL RESPONSE CENTER (PHONE NUMBER 800-424-8802).

WASTE DISPOSAL METHOD:
DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII: STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:
STORE IN A COOL, DRY LOCATION. KEEP AWAY FROM INCOMPATIBLE MATERIALS (SEE SECTION V). AVOID GENERATING OIL MISTS WHILE HANDLING. AVOID PROLONGED OR REPEATED SKIN CONTACT. WASH THOROUGHLY AFTER HANDLING. FOR USED MOTOR OIL: LAUNDER SATURATED CLOTHING BEFORE WEARING AND DISCARD OIL-SOAKED SHOES AND UNWASHABLE CLOTHING.

SECTION VIII: FIRE AND EXPLOSION HAZARD DATA

HAZARD RANKING
(0= LEAST, 1= SLIGHT, 2= MODERATE, 3= HIGH, 4= EXTREME)

NFPA HAZARD CLASS:
HEALTH HAZARD: 0,
FLAMMABILITY: 1
REACTIZITY: 0,
OTHER: NONE

MATERIAL SAFETY AND DATA SHEET
PAGE 4 OF 4

PRODUCT CODE NO.: MOAEO

DOT FLAMMABILITY CLASSIFICATION: NOT REGULATED
FLASH POINT: 390-400 COC F

EXTINGUISHING MEDIA:
EXTINGUISH WITH DRY CHEMICAL, CO2, WATER SPRAY, FOAM, SAND OR EARTH. WATER AND FOAM MAY CAUSE FROTHING.

FIRE & EXPLOSION HAZARDS:
THIS MATERIAL WILL BURN, BUT WILL NOT IGNITE READILY.

FIRE FIGHTING PROCEDURES:
WATER SPRAY MAY BE USEFUL IN MINIMIZING VAPORS AND COOLING CONTAINERS EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF YOU CAN DO SO WITHOUT RISK.

SECTION IX: PHYSICAL DATA

APPROX BOILING POINT	VAPOR DENSITY	EVAPORATION RATE	% VOLITILE
ABOVE 600 F (316 C)	HEAVIER THAN AIR	SLOWER THAN ETHER	NEGLIGIBLE

% SOLUBILITY IN WATER	SPECIFIC GRAVITY	APPEARANCE	ODOR
NEGLIGIBLE	0.89-0.91	CLEAR, BROWN LIQUID	CHARACTERISTIC

SECTION X: PRECAUTIONARY LABEL

CAUTION: USED MOTOR OIL IS A POSSIBLE SKIN CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS. AVOID PROLONGED OR REPEATED SKIN CONTACT. AVOID MAKING OR BREATHING OIL MIST. USE ADEQUATE VENTILATION. WASH THOROUGHLY WITH SOAP AND WATER AFTER HANDLING.

SECTION XI: DOCUMENTARY INFORMATION

ISSUE DATE: JULY 2 1986 PRODUCT CODE NUMBER.: MOAEO

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)

IDENTITY (As Used on Label and List)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
"CIMPERIAL 1011	

Section I

Manufacturer's Name: Products Division/ Cincinnati Milacron Marketing Company	Emergency Telephone Number: 513-841-8181
Address (Number, Street, City, State, and ZIP Code): 4701 Marburg Avenue	Telephone Number for Information: 513-841-8964
Cincinnati, Ohio 45209	Date Prepared: 10/85
	Signature of Preparer (optional):

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
O-phenylphenol	---	---		
Triethanolamine	---	---		
Ethoxylated nonylphenol	---	---		
Mineral oil (mist)	5 mg/M3	5 mg/M3		

The ingredients listed above may contribute to the product hazard as listed in Section VI of this sheet.

Section III — Physical/Chemical Characteristics

ND = not determined

Boiling Point	ND	Specific Gravity (H_2O = 1)	1.006
Vapor Pressure (mm Hg.) Not applicable (NA)	NA	Melting Point	NA
Vapor Density (AIR = 1)	NA	Evaporation Rate (Butyl Acetate = 1)	NA

Solubility in Water: appreciable; emulsifiable

Appearance and Odor: Hazy; evergreen or sassafras

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
370°F (COC)	NA	NA	NA

Extinguishing Media: Foam, carbon dioxide

Special Fire Fighting Procedures: NA

Unusual Fire and Explosion Hazards: None

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	

Incompatibility (Materials to Avoid)
None known

Hazardous Decomposition or Byproducts
None.

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? YES Ingestion? NA

Health Hazards (Acute and Chronic) WARNING: Concentrate is alkaline. Harmful if taken internally. Concentrate is an eye irritant. Eye damage may occur from contact with concentrate. No adverse chronic effects expected when used as recommended.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure Eye damage may occur from contact with concentrate. This product is not a primary skin irritant; however, skin irritation may occur if used improperly (concentrate or mix).

Medical Conditions Generally Aggravated by Exposure May aggravate existing skin irritation where further defatting or skin penetration could occur.

Emergency and First Aid Procedures In case of eye contact, flush immediately with running water for 15 minutes, then get prompt medical attention to check for possible irritation. In case of skin contact with concentrate, wash immediately with water. If concentrate or mix is swallowed, do not induce vomiting. Dilute with water or milk. Immediately contact physician and obtain treatment.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled
Thoroughly flush with water to sewer.

Waste Disposal Method Ultrafiltration or acid-alum-polymer chemical treatment (followed by phenol-removing procedures, if required), or high temperature incineration.

Precautions to Be Taken in Handling and Storing Use only as recommended by Cincinnati Milacron. Avoid all contact of concentrate with eyes or prolonged contact with skin. Do not swallow. Avoid open flames, sparks, and temperatures over 370°F. If frozen, thaw completely at room temp.

Other Precautions
Contains amines. Do not add sodium nitrite or other nitrosating agents to this product. Suspected cancer-causing nitrosamines could be formed.

Section VIII — Control Measures

Respiratory Protection (Specify Type) Product not volatile.

Ventilation	Local Exhaust		Special
	Mechanical (General)	General	Other

Protective Gloves Waterproof gloves required when handling concentrate.

Eye Protection Safety shield or goggles required when handling concentrate.

Other Protective Clothing or Equipment
Effective metalworking plant protective clothing as appropriate.

Work/Hygienic Practices
Good personal hygiene should always be followed.

MERIT Oil & Refining Corp.
4150 N. Suttle Rd. · Portland, OR 97217
(503) 286-8352 1-800-367-8894
Fax: (503) 286-5027

MATERIAL SAFETY DATA SHEET

AERO SOLUBLE OIL

This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated into your MSDS.

1. PRODUCT IDENTIFICATION

AERO SOLUBLE OIL

CAUTION ! - MAY CAUSE EYE IRRITATION
- MAY BE HARMFUL IF SWALLOWED
- KEEP OUT OF REACH OF CHILDREN

2. FIRST AID

EYE CONTACT:
Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. No additional first aid should be necessary, however, if irritation persists, see a doctor.
SKIN CONTACT:
No first aid procedures are normally required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.
INHALATION:
Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.

INGESTION:
If swallowed, give water or milk to drink and telephone for medical advice. Consult medical personnel before inducing vomiting. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.

3. IMMEDIATE HEALTH EFFECTS

EYE CONTACT:
The eye irritation potential of this substance has not been determined. However, it may be slightly irritating to the eyes and could cause prolonged (days) impairment of your vision. The degree of the injury will depend on the amount of material that gets into the eye and the speed and thoroughness of the first aid treatment. Signs and symptoms may include pain, tears, swelling, redness, and blurred vision. This hazard evaluation is based on the known toxicity of the ingredients in this substance.
SKIN IRRITATION:
This substance is not expected to cause prolonged or significant skin irritation. This hazard evaluation is based on the data from similar materials.
DERMAL TOXICITY:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if it gets on the skin. This hazard evaluation is based on data from similar materials. Read the Additional Health Data section (12) of this document for more information.
RESPIRATORY/INHALATION:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if inhaled. This hazard evaluation is based on data from similar materials.
INGESTION:
The oral toxicity of this substance has not been determined. However, it may be slightly toxic to internal organs if swallowed. The degree of injury will depend on the amount absorbed from the gut. This hazard evaluation is based on the known toxicity of the ingredients in this substance. Read the Additional Health Data section (12) of this document for more information.

4. PROTECTIVE EQUIPMENT

EYE PROTECTION:
Do not get this material in your eyes. Eye contact can be avoided by wearing chemical goggles.
SKIN PROTECTION:
No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing protective clothing.

RESPIRATORY PROTECTION:
No special respiratory protection is normally required. However, if operating conditions create high airborne concentrations, the use of an approved respirator is recommended.
VENTILATION:
Use adequate ventilation to keep the airborne concentrations of this material below the recommended exposure standard.

5. FIRE PROTECTION

FLASH POINT: (COC) 320F (160C)
AUTOIGNITION: NDA
FLAMMABILITY LIMITS (% by volume in air): NDA
EXTINGUISHING MEDIA:
CO2, Dry Chemical, Foam, Water Fog
NFPA RATINGS: Health 1; Flammability 1; Reactivity 0; Special NDA
HMIS RATINGS: Health 1; Flammability 1; Reactivity 0; Other NDA;
(Least = 0, Slight = 1, Moderate = 2, High = 3, Extreme = 4). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association or, if applicable, the National Paint and Coatings Association.
FIRE FIGHTING PROCEDURES:
For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
COMBUSTION PRODUCTS:
Normal combustion forms carbon dioxide, water vapor and may produce oxides of sulfur.

6. STORAGE, HANDLING, AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:
NDA
STABILITY:
Stable
HAZARDOUS POLYMERIZATION:
Polymerization will not occur.
INCOMPATIBILITY:
May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc. Avoid contact with nitrites.
SPECIAL PRECAUTIONS:
READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

DO NOT WELD, HEAT OR DRILL CONTAINER! Residue may ignite with explosive violence if heated sufficiently. CAUTION! Do not use pressure to empty drum or explosion may result.

7. PHYSICAL PROPERTIES

SOLUBILITY: Forms a stable emulsion with water.
APPEARANCE: Pale lemon yellow liquid.
BOILING POINT: NDA
MELTING POINT: NA
EVAPORATION: NA
SPECIFIC GRAVITY: 0.91 @ 15.6/15.6C
VAPOR PRESSURE: NA
PERCENT VOLATILE (VOLUME %): NA
VAPOR DENSITY (AIR=1): NA
VISCOSITY: 28 cSt @ 40C (Min.)

8. ENVIRONMENTAL CONCERNS, SPILL RESPONSE AND DISPOSAL

CHEMTREC EMERGENCY PHONE NUMBER: (800) 424-9300 (24 hour)
SPILL/LEAK PRECAUTIONS:
This material is not expected to present any environmental problems other than those associated with oil spills.

Stop the source of the leak or release. Clean up releases as soon as possible. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases. However, because of its dispersant properties, this material forms emulsions with water.
DISPOSAL METHODS:
Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

9. EXPOSURE STANDARDS, REGULATORY LIMITS AND COMPOSITION

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

This product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5 mg/m3, the OSHA PEL is 5 mg/m3.

The percent compositions are given to allow for the various ranges of the components present in the whole product and may not equal 100%.

AERO SOLUBLE OIL

PERCENT/CAS#	COMPONENT/REGULATORY LIMITS
100.0 %	AERO SOLUBLE OIL
CONTAINING	
> 80.0 %	LUBRICATING BASE OIL

The BASE OIL may be a mixture of any of the following: CAS 64741884, CAS 64741895, CAS 64741964, CAS 64741975, CAS 64742014, CAS 64742525, CAS 64742536, CAS 64742547, CAS 64742627, CAS 64742650, CAS 72623837.

< 20.0 %	ADDITIVES, INCLUDING THE FOLLOWING
CAS111762	ETHANOL, 2-BUTOXY 25ppm ACGIH TLV 25ppm OSHA PEL
CAS107415	2-METHYL-2,4-PENTANEDIOL 25ppm ACGIH TLV

TLV - THRESHOLD LIMIT VALUE
STEL - Short-term Exposure Limit
RQ - Reportable Quantity
TWA - Time Weighted Average
CAS - Threshold Planning Quantity

10. REGULATORY INFORMATION

DOT SHIPPING NAME: NOT DESIGNATED AS A HAZARDOUS MATERIAL BY THE FEDERAL DOT. Petroleum Lubricating Oil, NOIBN
DOT HAZARD CLASS: NOT APPLICABLE
DOT IDENTIFICATION NUMBER: NOT APPLICABLE

SARA 311 CATEGORIES:

1. Immediate (Acute) Health Effects:	YES
2. Delayed (Chronic) Health Effects:	NO
3. Fire Hazard;	NO
4. Sudden Release of Pressure Hazard;	NO
5. Reactivity Hazard;	NO

WHEN A COMPONENT OF THIS MATERIAL IS SHOWN IN THIS SECTION, THE REGULATORY LIST ON WHICH IT APPEARS IS INDICATED.

2-METHYL-2,4-PENTANEDIOL	02,10,14,28
ETHANOL, 2-BUTOXY	02,10,14,17,25,26,28

AERO SOLUBLE OIL

REGULATORY LISTS SEARCHED:

01 = SARA 313	02 = MASS RTK	03 = NTP carcinogen
04 = CA Prop. 65	05 = MI 406	06 = IARC Group 1
07 = IARC Group 2A	08 = IARC Group 2B	09 = SARA 302/304
10 = PA RTK	11 = NJ RTK	12 = CERCLA 302.4
13 = MN RTK	14 = ACGIH TLV	15 = ACGIH STEL
16 = ACGIH Calculated TLV	17 = OSHA TWA	18 = OSHA STEL
19 = EPA Carcinogen	20 = TSCA Sect 4(e)	21 = TSCA Sect 5 (a) (e) (f)
22 = TSCA Sect 6	23 = TSCA Sect 12 (b)	24 = TSCA Sect 8 (a)
25 = TSCA 8 (d)	26 = TSCA 8 (e)	27 = Canadian WHMIS
28 = OSHA CEILING	29 = TSCA Sect 8 FYI	

11. PRODUCT TOXICOLOGY DATA

EYE IRRITATION:
NDA. The hazard evaluation was based on data on the components.
SKIN IRRITATION:
NDA. The hazard evaluation was based on data from similar materials.
DERMAL TOXICITY:
NDA. The hazard evaluation was based on data from similar materials.
RESPIRATORY/INHALATION:
NDA. The hazard evaluation was based on data from similar materials.
INGESTION:
NDA. The hazard evaluation was based on data from similar materials.

12. ADDITIONAL HEALTH DATA

ADDITIONAL HEALTH DATA COMMENT:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

ıta Sheet

ıe last revised 03/08/88

MICHIGAN INDUSTRIAL PRODUCTS CO.

I. General Information

ıemical Name & Synonyms: ORGANIC ESTERS	Trade Name & Synonyms: LUBRIFORGE 20-NP
ıical Family: POLYMERS	Formula: WATER SOLUBLE POLYMERS
ıoper DOT Shipping Name: SAME	DOT Hazard Classification: NONE
ıufacturer: MICHIGAN INDUSTRIAL PRODUCTS COMPANY	Manufacturer's Phone Number: 313-985-4545
ıufacturer's Address:)1 16TH ST., PORT HURON, MI 48060	Chemtrec Phone Number: N/A

II. Ingredients

Principal Hazardous Components	Percent	Threshold Limit Value (units)
HAZARDOUS INGREDIENTS		

III. Physical Data

ıiling Point (°F): 220°F	Specific Gravity (H_2O = 1): 1.10
ıor Pressure (mm Hg.): <760 MM	Percent Volatile By Volume (%): 82.0
ıapor Density (Air = 1): 0.62	Evaporation Rate (WATER = 1): 0.75
ıubility in Water: COMPLETE	pH:
ıearance & Odor: OILY BROWN - BLAND	

IV. Fire & Explosion Hazard Data

ı Point (Test Method): NONE	Auto Ignition Temperature: NONE	
ımmable Limits: NE	LEL: NONE	UEL: NONE

ıguishing Media: NOT NEEDED

ıial Fire Fighting Procedures: T NEEDED

ıual Fire & Explosion Hazards: NONE

Attachment for Response to DEQ Comment 6 and 9

Lampros

.9528451 MATERIAL SAFETY DATA SHEET (MSDS) 5E804

This MSDS should be attached or kept with the respective product with which it is associated.

)4

MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : INDUSTRIAL PURE STRENGTH-SPRAY
IDENTIFICATION NUMBER: 3599 838
DATE PRINTED : 12-11-97

PRODUCT USE/CLASS : CLEANER/DEGREASER

SUPPLIER:
RUST-OLEUM CORPORATION
11 HAWTHORN PARKWAY
VERNON HILLS, ILLINOIS
60061 USA

(847) 367-7700 RUST-OLEUM CORP.
MON.-FRI, 8:00 AM-4:30 PM

MANUFACTURER:
RUST-OLEUM CORPORATION
11 HAWTHORN PARKWAY
VERNON HILLS, ILLINOIS
60061 USA

(847) 367-7700 RUST-OLEUM CORP.
MON.-FRI, 8:00 AM-4:30 PM

PREPARER: LJW, PHONE: , PREPARE DATE: 07-25-97

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

ITEM	CHEMICAL NAME	CAS NUMBER	WT/WT % LESS THAN
01	D-LIMONENE TECH GRADE	5989-27-5	75.0 %
02	LIQUIFIED PETROLEUM GAS	68476-85-7	30.0 %

EXPOSURE LIMITS

	ACGIH		OSHA		COMPANY	
ITEM	TLV-TWA	TLV-STEL	PEL-TWA	PEL-CEILING	TLV-TWA	SKIN
01	N.E.	N.E.	N.E.	N.E.	N.E.	NO
02	1000 PPM	N.E.	1000 PPM	N.E.	N.E.	NO

(SEE SECTION 16 FOR ABBREVIATION LEGEND)

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: DO NOT TASTE OR SWALLOW.

EFFECTS OF OVEREXPOSURE - EYE CONTACT: CAN CAUSE SEVERE EYE IRRITATION. IRRITATING, AND MAY INJURE EYE TISSUE IF NOT REMOVED PROMPTLY.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: NO INFORMATI

SECTION 7 - HANDLING AND STORAGE

HANDLING: WASH THOROUGHLY AFTER HANDLING. FOLLOW ALL MSDS/LABEL PRECAUTIONS EVEN AFTER CONTAINER IS EMPTIED BECAUSE IT MAY RETAIN PRODUC RESIDUES.

STORAGE: KEEP AWAY FROM HEAT, SPARKS, FLAME AND SOURCES OF IGNITION.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: USE PROCESS ENCLOSURES, LOCAL EXHAUST VENTILATION OR OTHER ENGINEERING CONTROLS TO CONTROL AIRBORNE LEVELS BELOW RECOMMEND EXPOSURE LIMITS. PREVENT BUILD-UP OF VAPORS BY OPENING ALL DOORS AND WINDOWS TO ACHIEVE CROSS-VENTILATION.

RESPIRATORY PROTECTION: A RESPIRATORY PROTECTION PROGRAM THAT MEETS OSH 1910.134 AND ANSI Z88.2 REQUIREMENTS MUST BE FOLLOWED WHENEVER WORKPLACE CONDITIONS WARRANT A RESPIRATOR'S USE.

SKIN PROTECTION: USE GLOVES TO PREVENT PROLONGED SKIN CONTACT.

EYE PROTECTION: USE SAFETY EYEWEAR DESIGNED TO PROTECT AGAINST SPLASH O LIQUIDS.

OTHER PROTECTIVE EQUIPMENT: REFER TO SAFETY SUPERVISOR OR INDUSTRIAL HYGIENIST FOR FURTHER INFORMATION REGARDING PERSONAL PROTECTIVE EQUIPMEN AND ITS APPLICATION.

HYGIENIC PRACTICES: WASH THOROUGHLY WITH SOAP AND WATER BEFORE EATING, DRINKING OR SMOKING.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

BOILING RANGE	: -34 - 310 F	VAPOR DENSITY	: IS HEAVIER THAN A
ODOR	: CITRUS	ODOR THRESHOLD	: ND
APPEARANCE	: LIQUID	EVAPORATION RATE:	IS SLOWER THAN ET
SOLUBILITY IN H2O	: N.D.		
FREEZE POINT	: ND	SPECIFIC GRAVITY:	1.0078
VAPOR PRESSURE	: ND	PH AT 0.0 %	: ND
PHYSICAL STATE	: LIQUID	VISCOSITY	: ND

COEFFICIENT OF WATER/OIL DISTRIBUTION: ND

(SEE SECTION 16 FOR ABBREVIATION LEGEND)

CRAW00004650

EFFECTS OF OVEREXPOSURE - SKIN CONTACT: CONTACT CAUSES SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. LOW HAZARD FOR USUAL INDUSTRIAL HANDLING OR COMMERCIAL HANDLING BY TRAINED PERSONNEL.

EFFECTS OF OVEREXPOSURE - INHALATION: PROLONGED OR EXCESSIVE INHALATION MAY CAUSE RESPIRATORY TRACT IRRITATION. CAUSES NOSE AND THROAT IRRITATION. BREATHING SMALL AMOUNTS DURING NORMAL HANDLING IS NOT LIKELY TO CAUSE HARMFUL EFFECTS; BREATHING LARGE AMOUNTS MAY BE HARMFUL. SYMPTOMS OF OVEREXPOSURE INCLUDE NOSE, THROAT AND RESPIRATORY TRACT IRRITATION. PRE-EXISTING LUNG DISORDERS, E.G. ASTHMA-LIKE CONDITIONS, MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL.

EFFECTS OF OVEREXPOSURE - INGESTION: SUBSTANCE MAY BE HARMFUL IF SWALLOWED.

EFFECTS OF OVEREXPOSURE - CHRONIC HAZARDS: CONTAINS D-LIMONENE, WHICH IS AN IARC GROUP 3 AGENT; "PROBABLY NOT CARCINOGENIC TO HUMANS". D-LIMONENE IS NOT CLASSIFIED AS A CARCINOGEN BY OSHA, NTP NOR ACGIH.

PRIMARY ROUTE(S) OF ENTRY: SKIN CONTACT INHALATION EYE CONTACT

SECTION 4 - FIRST AID MEASURES

FIRST AID - EYE CONTACT: HOLD EYELIDS APART AND FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

FIRST AID - SKIN CONTACT: WASH WITH SOAP AND WATER. GET MEDICAL ATTENTION IF IRRITATION DEVELOPS OR PERSISTS.

FIRST AID - INHALATION: NO INFORMATION.

FIRST AID - INGESTION: SWALLOWING LESS THAN AN OUNCE WILL NOT CAUSE SIGNIFICANT HARM. FOR LARGER AMOUNTS, DO NOT INDUCE VOMITING, BUT GIVE ONE OR TWO GLASSES OF WATER TO DRINK AND GET MEDICAL ATTENTION.

SECTION 5 - FIRE FIGHTING MEASURES

FLASH POINT: -10 F

LOWER EXPLOSIVE LIMIT: 0.7 %

UPPER EXPLOSIVE LIMIT: 9.5 %

AUTOIGNITION TEMPERATURE: ND

EXTINGUISHING MEDIA: DRY CHEMICAL FOAM WATER FOG

UNUSUAL FIRE AND EXPLOSION HAZARDS: NO INFORMATION.

SPECIAL FIREFIGHTING PROCEDURES: NO INFORMATION.

SECTION 10 - STABILITY AND REACTIVITY

CONDITIONS TO AVOID: AVOID ALL POSSIBLE SOURCES OF IGNITION.

INCOMPATIBILITY: INCOMPATIBLE WITH STRONG OXIDIZING AGENTS, STRONG ACID AND STRONG ALKALIES.

HAZARDOUS DECOMPOSITION PRODUCTS: BY OPEN FLAME, CARBON MONOXIDE AND CARBON DIOXIDE.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR UNDER NORMAL CONDITIONS.

STABILITY: THIS PRODUCT IS STABLE UNDER NORMAL STORAGE CONDITIONS.

SECTION 11 - TOXICOLOGICAL PROPERTIES

COMPONENT TOXICOLOGICAL INFORMATION:

CHEMICAL NAME	LD50	LC50
D-LIMONENE TECH GRADE	RAT 5G/KG	N.E.
LIQUIFIED PETROLEUM GAS	N.E.	N.E.

SECTION 12 - ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: PRODUCT IS A MIXTURE OF LISTED COMPONENTS.

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: DISPOSE OF MATERIAL IN ACCORDANCE TO LOCAL, STATE AND FEDERAL REGULATIONS AND ORDINANCES. DO NOT ALLOW TO ENTER STORM DRAINS SEWER SYSTEMS.

SECTION 14 - TRANSPORTATION INFORMATION

NO TRANSPORTATION INFORMATION IS AVAILABLE.

SECTION 15 - REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS: AS FOLLOWS -

OSHA: HAZARDOUS BY DEFINITION OF HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200)

CERCLA - SARA HAZARD CATEGORY:
THIS PRODUCT HAS BEEN REVIEWED ACCORDING TO THE EPA 'HAZARD CATEGORIES' PROMULGATED UNDER SECTIONS 311 AND 312 OF THE SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 (SARA TITLE III) AND IS CONSIDERED, UNDER APPLICABLE DEFINITIONS, TO MEET THE FOLLOWING CATEGORIES:

FIRE HAZARD

SARA SECTION 313:
THIS PRODUCT CONTAINS THE FOLLOWING SUBSTANCES SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372:

CHEMICAL NAME	CAS NUMBER	WT/WT % IS LESS THAN

NO SARA SECTION 313 COMPONENTS EXIST IN THIS PRODUCT.

TOXIC SUBSTANCES CONTROL ACT:
THIS PRODUCT CONTAINS THE FOLLOWING CHEMICAL SUBSTANCES SUBJECT TO THE REPORTING REQUIREMENTS OF TSCA 12(B) IF EXPORTED FROM THE UNITED STATES:

CHEMICAL NAME	CAS NUMBER

NO INFORMATION IS AVAILABLE.

U.S. STATE REGULATIONS: AS FOLLOWS -

NEW JERSEY RIGHT-TO-KNOW:
THE FOLLOWING MATERIALS ARE NON-HAZARDOUS, BUT ARE AMONG THE TOP FIVE COMPONENTS IN THIS PRODUCT:

CHEMICAL NAME	CAS NUMBER
ALCOHOL ETHOXYLATE MIXTURE	68439-46-3

PENNSYLVANIA RIGHT-TO-KNOW:
THE FOLLOWING NON-HAZARDOUS INGREDIENTS ARE PRESENT IN THE PRODUCT AT GREATER THAN 3%:

CHEMICAL NAME	CAS NUMBER
ALCOHOL ETHOXYLATE MIXTURE	68439-46-3

CALIFORNIA PROPOSITION 65:
WARNING: THE CHEMICAL(S) NOTED BELOW AND CONTAINED IN THIS PRODUCT, ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM:

CHEMICAL NAME	CAS NUMBER

NO PROPOSITION 65 CHEMICALS EXIST IN THIS PRODUCT.

INTERNATIONAL REGULATIONS: AS FOLLOWS -

CANADIAN WHMIS: THIS MSDS HAS BEEN PREPARED IN COMPLIANCE WITH CONTROLLED PRODUCT REGULATIONS EXCEPT FOR USE OF THE 16 HEADINGS.

CANADIAN WHMIS CLASS: NO INFORMATION AVAILABLE.

TION 16 - OTHER INFORMATION

HMIS RATINGS - HEALTH: 2 FLAMMABILITY: 4 REACTIVITY: 0

PREVIOUS MSDS REVISION DATE: 07-25-97

REASON FOR REVISION: REVISED MSDS.

LEGEND: N.A. - NOT APPLICABLE, N.E. - NOT ESTABLISHED,
N.D. - NOT DETERMINED

: NO INFORMATION.

THE INFORMATION CONTAINED ON THIS MSDS HAS BEEN CHECKED AND SHOULD BE ACCURATE. HOWEVER, IT IS THE RESPONSIBILITY OF THE USER TO COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS.

December 30, 1997

Jalapa Gas & Chemical Corp.
P.O. Box 24159
Houston, Texas 77229-4159

MATERIAL SAFETY DATA SHEET (MSDS)

Phone numbers: Voice (713) 643-2408 Spill Chemtrek (800) 424-9300
Fax (713) 643-0771 (202) 483-7616 24-hrs.

A. Product Identification

Chemtane II Fabgas
Gas Mixture (for composition see B. Hazardous components)

B. Hazardous Components

Ingredients	CAS Number	OSHA PEL	ACGIH TLV
Propane	74-98-6	1000 ppm	1000 ppm
n-Butane	106-97-8	800 ppm	800 ppm
n-Pentane	109-66-0	600 ppm	600 ppm
Isohexanes	8030-30-6	NE	NE
Soltrol 100	68551-16-6	NE	NE
2,3 Dimethylbutane	79-29-8	500 ppm	500 ppm
Xylene	1330-20-7	100 ppm	100 ppm
Cyclopentane	287-92-3	600 ppm	600 ppm
2-Methylpentane	107-83-5	500 ppm	500 ppm

C. Physical/Chemical Characteristics

Boiling Point – 43.6 °F -42 °C
Specific Gravity 0.505 @ 15.6 / 15.6 °C
Vapor Pressure 218 PSI @ 37.78 °C
Evaporation Rate (Butyl Acetate = 1) 1.00
Solubility in Water Not Soluble
Appearance is Light Green
Odor – distinct Odor of Commercial Natural Gas

D. Fire and Explosion Hazard Data

Flash Point -150 °F (-101 °C) LEL 2.3% UEL 9.4%

NFPA RATINGS: Health 1; Flammability 4; Reactivity 0; Special NDA
(Least - 0, Moderate - 2, High - 3, Extremely - 4)
These values are obtained using the guidelines of published evaluations.

Extinguishing Media CO_2 foam, Dry Chemical

Special fire fighting procedures, foam, dry chemical; water is not suitable except to keep containers cool.

Unusual Fire and Explosion Hazards Pressurized containers can present explosion hazard in fire.

High volatility, heavier than air.

This product presents an extreme fire hazard. Liquid very quickly evaporates, even at low temperatures and forms vapors (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be ignited by sources such as pilot lights, welding equipment, and electrical motors and switches.

E. Personal Protection Information

Ventilation: Use adequate ventilation to control exposure below recommended levels.

Respiratory Protection: Not generally required for concentrations not exceeding the recommended exposure level, use NIOSH/MSHA approved air purifying respirator.

Eye Protection: Use safety glasses with side shields. For splash protection use face shield and chemical goggles.

Skin Protection: Avoid unnecessary skin contamination with material. Use gloves of Neoprene or Viton construction if liquid contact could occur.

Note: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

F. Handling and Storage Precautions

Avoid contact with eyes, skin or clothing. Avoid breathing vapors, mist, fumes or dust. Do not swallow. May be aspirated into lungs. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use with adequate ventilation.

Keep away from heat, sparks and flame. Store in well-ventilated area. Store in tightly closed container. Bond and ground during liquid transfer.

G. Reactivity Data

Stability: Stable
Conditions to Avoid: Not Applicable
Incompatibility (Materials to Avoid): Oxygen and strong oxidizing agents

Hazardous Polymerization: Will Not Occur
Conditions to Avoid: Not Applicable
Hazardous Decomposition Products: Carbon oxides formed when burned.

H. Health Hazard Data

Recommended Exposure limits
See Section B.

HEALTH HAZARD (continued)

-EXTREMELY FLAMMABLE
-LIOUID CAN CAUSE SKIN AND EYE INJURY
-MAY EXCLUDE OXYGEN AVAILABLE FOR BREATHING
-LEAK DETECTION BY SENSE OF SMELL
-CONTENTS UNDER PRESSURE
-KEEP OUT OF REACH OF CHILDREN

ACUTE EFFECTS OF OVEREXPOSURE:

Eye: Liquid or vapors may be mildly irritating.

Skin: Prolonged or repeated contact with the liquid may cause defatting of the skin resulting in drying, redness, and possibly blistering.

Inhalation: Vapors may be mildly irritating to lungs and mucous membranes of the nose and throat. Overexposure may cause dizziness, headache, excitation, drowsiness, incoordination, anesthesia, unconsciousness, and respiratory arrest As an example, exposure to butane in concentration of 5000 ppm for ten minutes were found not to be irritating to the mucous membranes or to produce local or systemic effects in humans. A four hour inhalation LD50, rat, for butane (Commercial Grade) > 6100 ppm.

Ingestion: May cause effects similar to those of inhalation and gastrointestinal irritation. If swallowed, may be aspirated resulting inflammation and possible fluid accumulation in the lungs.

SUBCHRONIC AND CHRONIC EFFECTS OF OVEREXPOSURE:

No known applicable effects

OTHER HEALTH EFFECTS:

None of the components were mutagenic in the Salmonella typhimurium assay.
A Toxicity study summary for the components is available upon request.

HEALTH HAZARD CATEGORIES:

Target Organ Toxin No

FIRST AID AND EMERGENCY PROCEDURES:

Eye: Flush eyes with running water for at least fifteen minutes.
If irritation or adverse symptoms develop, seek medical attention.

Skin: Wash skin with Soap and water. If irritation or adverse symptoms develop, seek medical attention.

Inhalation: Remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.

Ingestion: Do not induce vomiting. Seek immediate medical attention.

Note to physician: Gastric lavage using a cuffed endotracheal tube may be performed at your discretion.

I. Physical Data

SOLUBILITY: Soluble in alcohol, ether and hydrocarbons; insoluble in water
Vapor Pressure: 218 PSI at 100 °F (37.78 °C)
Specific Gravity of Gas (compared to air) (Air = 1): 1
Solubility in Water: Negligible
Specific Gravity of Liquid (H_2O = 1): 0.505 at 60/60 °F (15.6/15.6 °C)
Percent Volatile by Volume: 100
Evaporation Rate (Butyl Acetate = 1): > NA

J. Fire and Explosion Data

Flash Point: -150 °F (-101 °C) (CC)
Flammable Limits (% by Volume in Air): LEL 2.3% UEL 9.4%

Fire Extinguishing Media: Dry Chemical, foam or carbon dioxide (CO_2)

Special Fire Fighting Procedures: Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus and other protective equipment and/ or garments described in Section C if exposure conditions warrant. Shut off source if possible. Water fog or spray may be used to cool exposed containers and equipment. Do not spray water directly on fire product will float and could be reignighted on surface of water.

Fire and Explosion Hazards: Carbon oxides formed when burned. Highly flammable vapors which are heavier than air may accumulate in low areas and/or spread along ground away from handling site.
Flash back along vapor trail is possible.

K. *Spill, Leak and Disposal Procedures*

Precautions Required if Material is Released or Spilled:
Evacuate area of all unnecessary personnel. Wear Protective equipment and/or garments described in Section C if exposure conditions warrant. Shut off source if possible and contain spill. Protect from ignition. Keep out of water sources and sewers. Absorb in dry, inert material (sand, clay, etc.). Transfer to disposal drums using non-sparking equipment.

Waste Disposal (Insure Conformity with all Applicable Disposal regulations): Incinerate or otherwise manage at a RCRA permitted waste management facility.

L. *DOT Transportation*

DOT IDENTIFICATION NUMBER UN1954
DOT Shipping Name: Liquified Petroleum Gas
Dot Hazard Class 2.1 (Flammable Gas)
Hazardous Substance/RQ: Not Applicable

M. *RCRA Classification -UNADULTERATED PRODUCT AS A WASTE*

Ignitable (D001)

N *Protection Required for Work on Contaminated Equipment*

Contact immediate supervisor for specific Instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant.

O. *Hazard Classification*

Yes This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

Yes Combustible Liquid	Yes Flammable Gas	No Toxic
No Suspect Carcinogen	No Mutagen	No Corrosive
No Known Carcinogen	No Target Organ Toxin	No Teratogen
No Allergic Sensitizer	No Irritant	No Highly Toxic

Additional information is listed in Section R. regulatory Information. The lists which were searched are listed in section R. regulatory Information . The Carcinogenicity data was searched in IARC, NTP Carcinogen, EPA Carcinogen, and OSHA Ceiling.

Other Health Effects:
Propane, n-butane and n-pentane were nonmutagenic in the Salmonella typhimurium assay.

P. *ENVIRONMENTAL CONCERNS, SPILL RESPONSE AND DISPOSAL*

Chemtrek Emergency Phone (800) 424-9300 / (202) 483-7616 (24 hr)
Spill/Leak Precautions

Q. *Additional Comments*

SARA 311 CATEGORIES:	1. Immediate (Acute) Heath Effects:	YES
	2. Delayed (Chronic) Heath Effects:	NO
	3. Fire Hazard:	YES
	4. Sudden Release of Pressure Hazard:	YES
	5. Reactivity Hazard:	NO

SARA 313

As of the preparation date, this product was not subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

R. *Additional Comments*

REGULATORY LISTS SEARCHED:

01=SARA 313	02=MASS RTK	03=NTP Carcinogen
04=CA Prop. 65	05=MI 406	06=IARC Group 1
07=IARC Group 2A	08=IARC Group 2B	09=SARA 302/304
10=PA RTK	11=NJ RTK	12=CERCLA 302.4
13=MN RTK	14=ACGIH TLV	15=ACGIH STEL
16=ACGIH Calculated TLV	17=OSHA TWA	18=OSHA STEL
19=Chevron TLV	20=EPA Carcinogen	21=TSCA Sect 4(e)
22=TSCA Sect 5(a)(e)(f)	23=TSCA Sect 6	24=TSCA Sect 12(b)
25=TSCA Sect 8(a)	26=TSCA Sect 8(d)	28=Canadian WHMIS
29=OSHA CEILING		

The following components of this Material are found on the regulatory lists indicated.

Ethane	02, 10, 11, 13, 14
Propane	02, 10, 11, 13, 14, 17
n-Butane	02, 10, 11, 13, 14, 17, 28
I-Butane	02, 10, 11, 13, 14, 17, 28
n-Pentane	02, 10, 11, 13, 14, 17, 28
Cyclopentane	02, 10, 11, 13, 14, 17, 28
2-Methylpentane	02, 10, 11, 13, 14, 17, 28

MSDS Preparation by
INERTIA, Inc., 2002 Mustang Lane, Rosharon, TX 77583

Lampros

8428930 MATERIAL SAFETY DATA SHEET (MSDS) 5W540

This MSDS should be attached or kept with the respective product with which it is associated.

39,5W540

ATERIAL SAFETY DATA SHEET

. TION 1 - PRODUCT AND COMPANY IDENTIFICATION

DUCT NAME: BALL PAINT MARKER

EVISION #: 1.5 DATE PREPARED: JANUARY 18, 1995 DATE REVISED: JULY 2, 1998

UFACTURER:

A-CO INDUSTRIES, INC./MARKAL CO.

1 PRATT BLVD.
LK GROVE VILLAGE, IL, USA
97-5746

NFORMATION TELEPHONE: 847-956-7600
MERGENCY TELEPHONE: CALL CHEMTREC
SA 800-424-9300
...ERNATIONAL (CALL COLLECT) 1-703-527-3887

MICAL FORMULA: MIXTURE

AS NO.: NOT APPLICABLE SYNONYMS: NOT APPLICABLE DERIVATION: NOT APPLICABLE

ERAL USE: PAINT MARKER FOR HARD SURFACES

ECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

REDIENT	CAS NO.	%
TL ALCOHOL 3,4,5,6	64-17-5	1-3
IH: TWA = 1000 PPM		
OSHA: TWA = 1000 PPM		
HSE HS40: TWA = 1000 PPM		
...PROPYL ALCOHOL 3,4,5,6	67-63-0	2-3
ACGIH: TWA = 400 PPM, STEL = 500 PPM		
HA: TWA = 400 PPM		
E HS40: TWA = 400 PPM, STEL = 500 PPM		
...PYLENE GLYCOL METHYL ETHER 3,4,5,6	107-98-2	68-79
GIH: TWA = 100 PPM, STEL = 150 PPM		
OSHA: TWA = 100 PPM, STEL = 150 PPM		
HSE HS40: TWA = 100 PPM, STEL = 300 PPM		
. YLENE GLYCOL N-BUTYL ETHER 3,4,5,6	111-76-2	1-3
ACGIH: TWA = 25 PPM		
HA: TWA = 50 PPM		
E HS40: TWA = 25 PPM		

SECTION 5 - FIRE FIGHTING MEASURES

FLASH POINT (METHOD): 70 F. TO 75 F./21 C. TO 24 C. (TCC)
AUTOIGNITION TEMPERATURE: NOT DETERMINED

LEL: 0.9% UEL: 19%

FLAMMABILITY CLASSIFICATION: FLAMMABLE

EXTINGUISHING MEDIA: FOAM, ALCOHOL FOAM, CARBON DIOXIDE, DRY CHEMICAL, WATE FOG.

HAZARDOUS COMBUSTION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE, NITROGEN OXIDES.

UNUSUAL FIRE OR EXPLOSION HAZARDS: NOT APPLICABLE

FIRE-FIGHTING INSTRUCTIONS/EQUIPMENT: KEEP PERSONNEL REMOVED AND UPWIND OF FIRE. WEAR FULL FIRE-FIGHTING TURN-OUT GEAR (FULL BUNKER GEAR), AND RESPIRA PROTECTION (SCBA).

NFPA RATING: HEALTH 1, FLAMMABILITY 3, REACTIVITY 0

SECTION 6 - ACCIDENTAL RELEASE MEASURES

USE RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (SEE SECTION 8).

SMALL SPILL: REMOVE SOURCES OF IGNITION. WIPE UP WITH A TOWEL OR RAG.

LARGE SPILL: REMOVE SOURCES OF IGNITION. AVOID BREATHING VAPORS. VENTILATE AREA. DIKE AREA TO CONTAIN SPILL. ABSORB SPILL WITH SAW DUST OR OTHER SUITA ABSORBENT. TRANSFER TO METAL WASTE CONTAINER WITH NON-SPARKING TOOLS, TIGHT COVER WASTE CONTAINER.

SECTION 7 - HANDLING AND STORAGE

HANDLING PRECAUTIONS: USE RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (SEE SECTION 8). WASH THOROUGHLY AFTER HANDLING.

STORAGE REQUIREMENTS: STORE IN A COOL, DRY AREA.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE/FACE PROTECTION: SAFETY GLASSES WITH SPLASH GUARDS, GOGGLES OR FULL FAC SHIELD.

SKIN PROTECTION: SOLVENT RESISTANT GLOVES FOR PROLONGED OR REPEATED CONTACT

RESPIRATORY PROTECTION: IN RESTRICTED AREAS, USER APPROVED CHEMICAL/MECHANI FILTERS DESIGNED TO REMOVE PARTICLES AND ORGANIC VAPOR. IN CONFINED AREAS, APPROVED AIR LINE TYPE RESPIRATOR OR HOOD. SELF-CONTAINED BREATHING APPARAT IS REQUIRED FOR VAPOR CONCENTRATIONS ABOVE PEL/TLV/OES/MEL LIMITS (SEE SECT 2).

CRAW00004660

ERAL SPIRITS 64742-88-7 0-2

[illegible] SECTION 2 FOOTNOTES: SEE SECTION 15)

SECTION 3 - HAZARDS IDENTIFICATION

AGENCY OVERVIEW: FLAMMABLE. KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME.
E IRRITANT. AVOID CONTACT WITH EYES. KEEP OUT OF REACH OF CHILDREN.

ENTIAL HEALTH EFFECTS:

PRIMARY ENTRY ROUTES: EYES, SKIN, INGESTION, INHALATION.

TE EFFECTS:

EYES: LIQUID OR VAPOR CAN IRRITATE.
IN: MAY DRY THE SKIN. CAN BE ABSORBED THROUGH THE SKIN.
GESTION: ORAL TOXICITY IS LOW. CAN CAUSE NAUSEA.
INHALATION: RESPIRATORY IRRITATION, HEADACHE, NAUSEA, FATIGUE, DROWSINESS,
[illegible]PAIRED COORDINATION.

CHRONIC EFFECTS:

ES: PROLONGED CONTACT MAY LEAD TO CORNEAL DAMAGE.
IN: PROLONGED CONTACT MAY CAUSE IRRITATION OR DERMATITIS.
INGESTION: POSSIBLE LIVER AND KIDNEY DAMAGE.
HALATION: POSSIBLE LIVER AND KIDNEY DAMAGE.

CARCINOGENICITY: NOT APPLICABLE

GET ORGAN EFFECTS: CHRONIC OVER-EXPOSURE CAN CAUSE LIVER AND KIDNEY DAMAGE.

MEDICAL CONDITIONS AGGRAVATED BY LONG-TERM EXPOSURE: LIVER AND KIDNEY DISEASE.

ER INFORMATION: NOT APPLICABLE

[illegible]S RATING: HEALTH 1, FLAMMABILITY 3, REACTIVITY 0

SECTION 4 - FIRST AID

CONTACT: FLUSH WITH WATER FOR AT LEAST 15 MINUTES, OCCASIONALLY LIFTING
ER AND LOWER EYELIDS. GET MEDICAL ATTENTION.

N CONTACT: WIPE OFF EXCESS. WASH WITH SOAP AND WATER. GET MEDICAL ATTENTION
IRRITATION PERSISTS.

[illegible]GESTION: GET MEDICAL ATTENTION.

[illegible]HALATION: REMOVE VICTIM TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER
OXYGEN. IF BREATHING HAS STOPPED, APPLY ARTIFICIAL RESPIRATION. GET MEDICAL
ENTION.

OTHER INFORMATION: NOT APPLICABLE.

OTHER PROTECTIVE EQUIPMENT: EYE WASH AND SAFETY SHOWER.

ENGINEERING CONTROLS: NORMAL ROOM VENTILATION. LOCAL EXHAUST IN CONFINED AR

ADMINISTRATIVE CONTROLS: USERS OF THIS PRODUCT MUST BE PROPERLY TRAINED AND
QUALIFIED IN ITS USE.

OTHER INFORMATION: NOT APPLICABLE

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE/PHYSICAL STATE: LIQUID PAINT IN PLASTIC BOTTLE WITH METAL BALL P
TIP.
ODOR: PAINT-LIKE
ODOR THRESHOLD (PPM): NOT DETERMINED
SPECIFIC GRAVITY (H2O=1, @ 68 F./20 C.): 1
SOLUBILITY IN WATER: SLIGHT
COEFFICIENT OF WATER/OIL SOLUBILITY: LT 1
PH: NOT APPLICABLE
MELTING POINT: NOT APPLICABLE
BOILING POINT: 121-336 F./50-170 C.
VAPOR PRESSURE (MM HG AT 20 C.): APPROXIMATELY 12
VAPOR DENSITY (AIR=1): GT 1
EVAPORATION RATE (N-BUAC=1): APPROXIMATELY 0.7
V.O.C.: 74-87%(W/W), 82-85%(V/V), 6.2-7.2 LBS./GAL. (U.S.)

SECTION 10 - STABILITY AND REACTIVITY

CHEMICAL STABILITY: STABLE
HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
CONDITIONS TO AVOID: NOT APPLICABLE
CHEMICALS TO AVOID: STRONG OXIDIZING AGENTS
HAZARDOUS DECOMPOSITION PRODUCTS: NOT APPLICABLE

SECTION 11 - TOXICOLOGICAL INFORMATION

SENSITIZATION TO PRODUCT: NOT APPLICABLE
IRRITANCY OF PRODUCT: EYES, SKIN, RESPIRATORY TRACT.
REPRODUCTIVE TOXICITY: NOT APPLICABLE
TERATOGENICITY: NOT APPLICABLE
MUTAGENICITY: NOT APPLICABLE

TOXICOLOGICAL INFORMATION REGARDING INDIVIDUAL INGREDIENTS, IF APPLICABLE,
BE FOUND IN SECTION 2.

SECTION 12 - ECOLOGICAL INFORMATION

NOT DETERMINED.

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSE OF IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS.

ION 14 - TRANSPORT INFORMATION

.S. D.O.T.: CONSUMER COMMODITY ORM-D

ERNATIONAL MARITIME ORGANIZATION (IMO): EXEMPT (LT 0.5 L/MARKER)

..ERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): FLAMMABLE LIQUIDS, N.O.S.,
N NO. 1993

ERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO): FLAMMABLE LIQUIDS, N.O.S.,
NO. 1993

DR: UN 1263; CLASS 3; ITEM 31 (C); HAZARD IDENTIFICATION NO: 30. CEPIC
--CARD IS NOT APPLICABLE.

ECTION 15 - REGULATORY INFORMATION

NOTES FOR SECTION 2:

SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III, SECTION 313.

2 APPEARS ON THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT
SUBSTANCES LIST.

APPEARS ON THE MASSACHUSETTS SUBSTANCES LIST.

6 APPEARS ON THE NEW JERSEY RIGHT-TO-KNOW HAZARDOUS SUBSTANCES LIST.

5 APPEARS ON THE PENNSYLVANIA HAZARDOUS SUBSTANCES LIST.

APPEARS ON THE CANADIAN WHMIS INGREDIENT DISCLOSURE LIST.

SHA HAZARD STATUS: THIS PRODUCT IS CONSIDERED TO BE HAZARDOUS AS DEFINED BY
U.S. OSHA HCS (29 CFR 1910.1200).

XIC SUBSTANCES CONTROL ACT (TSCA): ALL INGREDIENTS CONTAINED IN THIS PRODUCT
LISTED ON THE U.S. EPA TSCA CHEMICAL SUBSTANCE INVENTORY.

ANADA:

IS STATUS: THIS PRODUCT IS CONSIDERED TO BE HAZARDOUS AS DEFINED BY CANADIAN
IS CONTROLLED PRODUCTS REGULATIONS.

IS RATING: D-2B, E-2

HMIS RISK PHRASES: FLAMMABLE. EYE IRRITANT.

IS PRECAUTIONARY STATEMENTS: KEEP AWAY FROM HEAT, SPARKS AND OPEN FLAME.
...ID CONTACT WITH EYES. KEEP OUT OF REACH OF CHILDREN.

ESTIC SUBSTANCES LIST (DSL): ALL INGREDIENTS CONTAINED IN THIS PRODUCT IS
S PRODUCT ARE LISTED ON THE CANADIAN EPA (CEPA) DOMESTIC SUBSTANCES LIST
(DSL).

.1

UROPEAN INVENTORY OF EXISTING CHEMICAL SUBSTANCES (EINECS): ALL INGREDIENTS
TAINED IN THIS PRODUCT ARE LISTED ON THE EUROPEAN INVENTORY OF EXISTING
...MICAL SUBSTANCES (EINECS).

EGORIES OF DANGER (LABELING INFORMATION): HARMFUL (XN), IRRITATING (XI)

RISK (R) PHRASES: FLAMMABLE (R10), HARMFUL IF SWALLOWED (S22), IRRITATING TO
...S (R36)

FETY (S) PHRASES: KEEP OUT OF REACH OF CHILDREN (S2), DO NOT BREATHE VAPOR (S23), AVOID CONTACT WITH SKIN (S24), IN CASE OF CONTACT WITH EYES, RINSE MEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE (S26), WEAR SUITABLE OTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION (S36/37/39), IN CASE OF FIRE USE FOAM, ALCOHOL FOAM, CARBON DIOXIDE, DRY CHEMICAL, WATER FOG (S43), IF SWALLOWED, SEEK MEDICAL ADVICE AND SHOW THIS CONTAINER, LABEL OR SAFETY DATA EET (S46).

FURTHER REGULATORY INFORMATION REGARDING INDIVIDUAL INGREDIENTS, IF APPLICABLE, Y BE FOUND IN SECTION 2.

THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE - 9. OSHA HAZARD COMMUNICATION STANDARD, THE CANADIAN WHMIS CONTROLLED PRODUCTS GULATIONS, THE BRITISH CHIP2 REGULATION 6, AND THE AUSTRALIAN NOHSCWHS. THIS MSDS CONTAINS THE INFORMATION REQUIRED BY THE ABOVE REGULATIONS AND CONFORMS TO ANSI Z400.1-1993.

CTION 16 - OTHER INFORMATION

DS PREPARED BY: DIRECTOR OF CHEMICAL SAFETY

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA AVAILABLE TO US AND IS ACCURATE AND RELIABLE TO THE BEST OF OUR KNOWLEDGE AND BELIEF. HOWEVER, LA-CO DUSTRIES, INC. MAKES NO REPRESENTATIONS AS TO ITS COMPLETENESS OR ACCURACY. __FORMATION IS SUPPLIED ON CONDITION THAT PERSONS RECEIVING SUCH INFORMATION WILL MAKE THEIR OWN DETERMINATION AS TO ITS SUITABILITY FOR THEIR PURPOSES IOR TO USE. IN NO EVENT WILL LA-CO INDUSTRIES, INC. BE RESPONSIBLE FOR MAGES OF ANY NATURE WHATSOEVER RESULTING FROM THE USE OF OR RELIANCE UPON THE INFORMATION CONTAINED HEREIN.

428930 HAZARDOUS MATERIAL WARNING (HAZMAT) 5W540

When shipment is complete, retain for daily Hazmat audit.

##

****

GRAINGER SHIPPING INFORMATION

STOCK # : 5W540

: 2SC94

FREIGHT CODE : 0800

SHOT PROPER SHIP NAME : CONSUMER COMMODITY, ORM-D

RESTRICTIONS : 20 LB. & UNDER REQUIRES 200 LB. BSC/32 ECT.
21 LB. & OVER REQUIRES 275 LB. BSC/44 ECT.

HAZARDOUS CLASS NUMBER :

ID # :

PACKING GROUP :

SHIPPING LABEL : ORM-D

:

TED QUANTITY : N

CARTON INSTRUCTIONS : REPACK IN GRAINGER S CARTON

EXEMPTION :

UPS EXEMPTION NO. :

COMMENTS 1 : HAZARDOUS MATERIAL. DO NOT SHIP AIR!!

COMMENTS 2 :

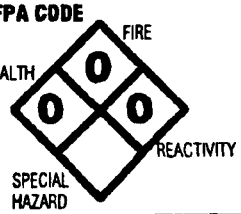
SHIPPING PAPERS : AUTOMATED BILL OF LADING REQUIRED FOR TRUCK SHIPMENTS.

CARD OFFERED ? YES ( ) NO ( ) PLEASE MARK ONE

ERG TO ACCOMPANY SHIPMENT

****

Lamprox

LENOX®	MATERIAL SAFETY DATA SHEET (MSDS)	USA HMIS INDEX HEALTH - 0 FLAMMABILITY - 0 REACTIVITY - 0 PERSONAL PROTECTION - A* (See Section VIII)	NFPA CODE  	CANADA WHMIS INDEX HEALTH - 0 FLAMMABILITY - 0 REACTIVITY - 0 PERSONAL PROTECTION - A* (See Section VIII)

SECTION I		EMERGENCY TELEPHONE NO.
TRADE NAME (If None, Put Chemical)	Band-Ade® Sawing Fluid	413/525-3961 ext. 608
CHEMICAL NAME AND SYNONYMS	Sawing Fluid Blend - Trade Secret	REVISED DATE 3/27/98
MANUFACTURER'S NAME	American Saw & Mfg. Company	SUPERCEDES 9/2/94
ADDRESS (Number, Street, City, State, Zip Code)	301 Chestnut Street, East Longmeadow, MA 01028 U.S.A.	

SECTION II - INGREDIENTS

This Fluid Does Not Contain Any Chemicals Listed in SARA Title III, Section 313 Of The Emergency Planning And Community Right-To-Know Act of 1986 Or In OSHA 29 CFR 1910, Subpart Z List.

Note - Canadian Users: This Is Not A Controlled Product Under The WHMIS Guidelines.

SECTION III - PHYSICAL DATA

BOILING POINT (°C) / (°F)	99°C / 210°F	PERCENT VOLATILE BY VOLUME (%)	NA
VAPOR PRESSURE (MM Hg.)	NA	pH	8.5 - 8.7
VAPOR DENSITY (AIR=1)	NA	EVAPORATION RATE	NA
SOLUBILITY IN WATER	100%	FREEZING POINT (°C) / (°F)	-6°C / 21°F
SPECIFIC GRAVITY (H_2O=1)	1.016	VISCOSITY (Room Temp.) 72°F	40 SUS
APPEARANCE AND ODOR	Translucent Amber, Odor - Characteristic		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	None.	FLAMMABLE LIMITS	None.	LEL NA	UEL NA
EXTINGUISHING MEDIA	Water Or Carbon Dioxide.				
SPECIAL FIRE FIGHTING PROCEDURES	None Required.				
UNUSUAL FIRE AND EXPLOSION HAZARDS	None.				

NA - Not Applicable

AMERICAN SAW & MFG. COMPANY
301 CHESTNUT STREET, EAST LONGMEADOW, MA 01028 U.S.A.
800/628-3030 • 413/525-3961
FAX: 800/223-7906 • 413/525-2336

EDP 40161

Lampros

Material Safety Data Sheet

- Click on the product name to go to the Salesfax description sheet.
- Click on the grade to go to the Salesfax typical test data sheet.

TARR CODE: H046

Chevron Hydraulic Oil AW ISO 46

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHEVRON Hydraulic Oil AW ISO 46

PRODUCT NUMBER(S): CPS238074 CPS255674

COMPANY IDENTIFICATION

Chevron Products Company
Global Lubricants
Environment, Health and Safety
Room 1131
555 Market St.
San Francisco, CA 94105-2870

EMERGENCY TELEPHONE NUMBERS

HEALTH (24 hr): (800)231-0623 or
(510)231-0623 (International)
TRANSPORTATION (24 hr): CHEMTREC
(800)424-9300 or (202)483-7616

PRODUCT INFORMATION: MSDS Requests: (800) 228-3500
Environmental, Safety, & Health Info: (415) 894-1899
Product Information: (800) 582-3835

2. COMPOSITION/INFORMATION ON INGREDIENTS

100.0 % CHEVRON Hydraulic Oil AW ISO 46

CONTAINING

COMPONENTS	AMOUNT	LIMIT/QTY	AGENCY/TYPE
LUBRICATING BASE OIL CONTAINING ONE OR MORE OF THE FOLLOWING	> 98.0%		
SOLVENT DEWAXED DIST., HVY PAR Chemical Name: DISTILLATES, SOLVENT DEWAXED HEAVY PARAFFINIC CAS64742650		5 mg/m3 (mist) 10 mg/m3 (mist) 5 mg/m3 (mist)	ACGIH TWA ACGIH STEL OSHA PEL
HYDROTREATED DIST., HVY PARA Chemical Name: DISTILLATES, HYDROTREATED HEAVY PARAFFINIC CAS64742547		5 mg/m3 (mist) 10 mg/m3 (mist) 5 mg/m3 (mist)	ACGIH TWA ACGIH STEL OSHA PEL

ADDITIVES
< 2.0%

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

This product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5 mg/m3, the OSHA PEL is 5 mg/m3.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS
EYE:
This substance is not expected to cause prolonged or significant eye irritation. This hazard evaluation is based on the data from similar materials.
SKIN:
This substance is not expected to cause prolonged or significant skin irritation. The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if it gets on the skin. This hazard evaluation is based on data from similar materials. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.
INGESTION:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if swallowed. This hazard evaluation is based on data from similar materials.
INHALATION:
The systemic toxicity of this substance has not been determined. However, it should be practically non-toxic to internal organs if inhaled. Prolonged or repeated breathing of petroleum oil mist can cause respiratory irritation. This hazard evaluation is based on data from similar materials.

4. FIRST AID MEASURES

EYE:
No first aid procedures are required. However, as a precaution flush eyes with fresh water for 15 minutes. Remove contact lenses if worn.
SKIN:
No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.
INGESTION:
If swallowed, give water or milk to drink and telephone for medical advice. Consult medical personnel before inducing vomiting. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.
INHALATION:
If respiratory discomfort or irritation occurs, move the person to fresh air. See a doctor if discomfort or irritation continues.
NOTE TO PHYSICIANS:
In an accident involving high pressure equipment, this product may be

injected under the skin. Such an accident may result in a small, sometime bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

5. FIRE FIGHTING MEASURES

SPECIAL NOTES: Leaks/ruptures in high pressure systems using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).
FLAMMABLE PROPERTIES:
FLASH POINT: (COC) 381F (194C) Min.
AUTOIGNITION: NDA
FLAMMABILITY LIMITS (% by volume in air): Lower: NA Upper: NA
EXTINGUISHING MEDIA:
CO2, Dry Chemical, Foam, Water Fog
NFPA RATINGS: Health 1; Flammability 1; Reactivity 0.
FIRE FIGHTING INSTRUCTIONS:
For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
COMBUSTION PRODUCTS:
Normal combustion forms carbon dioxide and water vapor and may produce oxides of sulfur and phosphorus. Normal combustion forms oxides of zinc. Incomplete combustion can produce carbon monoxide.

6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 hr): (800)424-9300 or (202)483-7616
ACCIDENTAL RELEASE MEASURES:
Stop the source of the leak or release. Clean up releases as soon as possible. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

7. HANDLING AND STORAGE

DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

DO NOT weld, heat or drill container. Residue may ignite with explosive violence if heated sufficiently. CAUTION! Do not use pressure to empty drum or drum may rupture with explosive force.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS
Use adequate ventilation to keep the airborne concentrations of this material below the recommended exposure standard.

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION:

data from similar materials.
ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

12. ECOLOGICAL INFORMATION

ECOTOXICITY:
No data available.
ENVIRONMENTAL FATE:
This material is not expected to present any environmental problems other than those associated with oil spills.

13. DISPOSAL CONSIDERATIONS

Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: NOT DESIGNATED AS A HAZARDOUS MATERIAL BY THE FEDERAL DOT
DOT HAZARD CLASS: NOT APPLICABLE
DOT IDENTIFICATION NUMBER: NOT APPLICABLE
DOT PACKING GROUP: NOT APPLICABLE

15. REGULATORY INFORMATION

SARA 311 CATEGORIES:	1. Immediate (Acute) Health Effects:	NO
	2. Delayed (Chronic) Health Effects:	NO
	3. Fire Hazard:	NO
	4. Sudden Release of Pressure Hazard:	NO
	5. Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED:

01=SARA 313	11=NJ RTK	22=TSCA Sect 5(a)(2)
02=MASS RTK	12=CERCLA 302.4	23=TSCA Sect 6
03=NTP Carcinogen	13=MN RTK	24=TSCA Sect 12(b)
04=CA Prop 65-Carcin	14=ACGIH TWA	25=TSCA Sect 8(a)

05=CA Prop 65-Repro Tox	15=ACGIH STEL	26=TSCA Sect 8(d)
06=IARC Group 1	16=ACGIH Calc TLV	27=TSCA Sect 4(a)
07=IARC Group 2A	17=OSHA PEL	28=Canadian WHMIS
08=IARC Group 2B	18=DOT Marine Pollutant	29=OSHA CEILING
09=SARA 302/304	19=Chevron TWA	30=Chevron STEL
10=PA RTK	20=EPA Carcinogen	

The following components of this material are found on the regulatory lists indicated.

DISTILLATES, HYDROTREATED HEAVY PARAFFINIC
is found on lists: 14,15,17,
DISTILLATES, SOLVENT DEWAXED HEAVY PARAFFINIC
is found on lists: 14,15,17,

NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows:
PETROLEUM OIL

---

16. OTHER INFORMATION

NFPA RATINGS: Health 1; Flammability 1; Reactivity 0;
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT:
This revision updates Section 1 (Company Identification).

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	TPQ - Threshold Planning Quantity
RQ - Reportable Quantity	PEL - Permissible Exposure Limit
C - Ceiling Limit	CAS - Chemical Abstract Service Number
A1-5 - Appendix A Categories	() - Change Has Been Proposed
NDA - No Data Available	NA - Not Applicable

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Toxicology and Health Risk Assessment Unit, CRTC, P.O. Box 4054, Richmond, CA 94804

****

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

****

THIS IS THE LAST PAGE OF THIS MSDS

****

Lamores

Material Safety Data Sheet

- Click on the product name to go to the Salesfax description sheet.
- Click on the grade to go to the Salesfax typical test data sheet.

Chevron Delo® 400 Multigrade SAE 15W-40 TARR CODE: D400 1540

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHEVRON DELO 400

PRODUCT NUMBER(S): CPS235101 CPS235109 CPS235117 CPS235118
CPS235119 CPS235120 CPS235200 CPS235246

SYNONYM: CHEVRON DELO 400 ESI Multigrade SAE 15W-40
CHEVRON DELO 400 Multigrade SAE 15W-40
CHEVRON DELO 400 SAE 10W
CHEVRON DELO 400 SAE 10W-30
CHEVRON DELO 400 SAE 20
CHEVRON DELO 400 SAE 30
CHEVRON DELO 400 SAE 40
CHEVRON DELO 400 SAE 50

COMPANY IDENTIFICATION

Chevron Products Company
Global Lubricants
555 Market St.
Room 803
San Francisco, CA 94105-2870

EMERGENCY TELEPHONE NUMBERS

HEALTH (24 hr): (800)231-0623 or
(510)231-0623 (International)
TRANSPORTATION (24 hr): CHEMTREC
(800)424-9300 or (703)527-3887
Int'l collect calls accepted

PRODUCT INFORMATION: MSDS Requests: (800) 228-3500
Environmental, Safety, & Health Info: (415) 894-0703
Product Information: (800) 582-3835

SPECIAL NOTES: This MSDS is for the entire line of CHEVRON DELO 400 products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

100.0 % CHEVRON DELO 400

CONTAINING

COMPONENTS	AMOUNT	LIMIT/QTY	AGENCY/TYPE
LUBRICATING BASE OIL SEVERELY REFINED PETROLEUM DISTILLATE	> 75.00%	5 mg/m3 (mist) 10 mg/m3 (mist) 5 mg/m3 (mist)	ACGIH TWA ACGIH STEL OSHA PEL

The BASE OIL may be a mixture of any of the following: CAS 64741884,

CAS 64741895, CAS 64741964, CAS 64741975, CAS 64742014, CAS 64742525, CAS 64742536, CAS 64742547, CAS 64742627, CAS 64742650, or CAS 72623837.

ADDITIVES INCLUDING THE FOLLOWING < 25.00%

ZINC ALKYL DITHIOPHOSPHATE
Chemical Name: PHOSPHORODITHIOIC ACID,O,O-DI-C1-14-ALKYL ESTERS, ZINC SALT

CAS68649423	< 1.60%	NONE		NA

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

This product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5 mg/m3, the OSHA PEL is 5 mg/m3.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS
EYE:
Not expected to cause prolonged or significant eye irritation.
SKIN:
Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.
INGESTION:
Not expected to be harmful if swallowed.
INHALATION:
Contains a petroleum-based mineral oil that may cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of airborne levels above the recommended exposure limit.

4. FIRST AID MEASURES

EYE:
No specific first aid measures are required because this material is not expected to cause eye irritation. As a precaution remove contact lenses, if worn, and flush eyes with water.
SKIN:
No specific first aid measures are required because this material is not expected to be harmful if it contacts the skin. As a precaution, remove clothing and shoes if contaminated. Use a waterless hand cleaner, mineral oil, or petroleum jelly to remove the material. Then wash skin with soap and water. Wash or clean contaminated clothing and shoes before reuse.
INGESTION:
No specific first aid measures are required because this material is not expected to be harmful if swallowed. Do not induce vomiting. As a precaution, give the person a glass of water or milk to drink and get medical advice. Never give anything by mouth to an unconscious person.
INHALATION:
If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

5. FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:
Classification (29 CFR 1910.1200): Not flammable or combustible.
FLAMMABLE PROPERTIES:
FLASH POINT: (COC) 392-428F (200-220C) min.
AUTOIGNITION: NDA
FLAMMABILITY LIMITS (% by volume in air): Lower: NA Upper: NA
EXTINGUISHING MEDIA:
CO2, Dry Chemical, Foam, Water Fog
NFPA RATINGS: Health 1; Flammability 1; Reactivity 0.
FIRE FIGHTING INSTRUCTIONS:
This material will burn although it is not easily ignited.
COMBUSTION PRODUCTS:
Normal combustion forms carbon dioxide and water vapor and may produce oxides of sulfur, nitrogen, phosphorus, and boron. Incomplete combustion can produce carbon monoxide.

6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 hr): (800)424-9300 or (703)527-3887
International Collect Calls Accepted
ACCIDENTAL RELEASE MEASURES:
Stop the source of the leak or release. Clean up releases as soon as possible. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

7. HANDLING AND STORAGE

Do not use pressure to empty drum or drum may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of. Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS
Use in a well-ventilated area. If user operations generate an oil mist, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
EYE/FACE PROTECTION:
No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
SKIN PROTECTION:
No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances. Suggested materials for protective gloves include: <Viton> <Nitrile> <Silver Shield> <4H>
RESPIRATORY PROTECTION:

No special respiratory protection is normally required. If user operations generate an oil mist, determine if airborne concentrations are below the recommended exposure limits. If not, select a NIOSH/MSHA approved respirator that provides adequate protection from concentrations of this material. Use the following elements for air-purifying respirators: particulate.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:
Dark brown liquid.

pH:	NDA
VAPOR PRESSURE:	NA
VAPOR DENSITY (AIR=1):	NA
BOILING POINT:	NDA
FREEZING POINT:	NDA
MELTING POINT:	NA
SOLUBILITY:	Soluble in hydrocarbon solvents; insoluble in water.
SPECIFIC GRAVITY:	0.87 - 0.89 @ 15.6/15.6C
VOLATILE ORGANIC COMPOUNDS (VOC):	1.1 wt.%, 9.256 g/l
EVAPORATION RATE:	NA
VISCOSITY:	5.9 - 18.6 cSt @ 100C (min.)
PERCENT VOLATILE (VOL):	NA

10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:
No data available.
CHEMICAL STABILITY:
Stable.
CONDITIONS TO AVOID:
No data available.
INCOMPATIBILITY WITH OTHER MATERIALS:
May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
HAZARDOUS POLYMERIZATION:
Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS:
The eye irritation hazard is based on data for a similar material.
SKIN EFFECTS:
The skin irritation hazard is based on data for a similar material.
ACUTE ORAL EFFECTS:
The acute oral toxicity is based on data for a similar material.
ACUTE INHALATION EFFECTS:
The acute respiratory toxicity is based on data for a similar material.
ADDITIONAL TOXICOLOGY INFORMATION:
This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for

Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

This product contains zinc alkyl dithiophosphates (ZDDPs). Several ZDDPs have been reported to have weak mutagenic activity in cultured mammalian cells but only at concentrations that were toxic to the test cells. We do not believe that there is any mutagenic risk to workers exposed to ZDDPs.

During use in engines, contamination of oil with low levels of cancer-causing combustion products occurs. Used motor oils have been shown to cause skin cancer in mice following repeated application and continuous exposure. Brief or intermittent skin contact with used motor oil is not expected to have serious effects in humans if the oil is thoroughly removed by washing with soap and water. See Chevron Material Safety Data Sheet No. 1793 for additional information on used motor oil.

12. ECOLOGICAL INFORMATION

ECOTOXICITY:
This material is not expected to be harmful to aquatic organisms.
ENVIRONMENTAL FATE:
This material is not expected to be readily biodegradable.

13. DISPOSAL CONSIDERATIONS

Oil collection services and collection centers are available for used motor oil recycling or disposal. Some service stations, automotive service centers, and retailers provide motor oil collection facilities.

Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: NOT DESIGNATED AS A HAZARDOUS MATERIAL BY THE FEDERAL DOT
DOT HAZARD CLASS: NOT APPLICABLE
DOT IDENTIFICATION NUMBER: NOT APPLICABLE
DOT PACKING GROUP: NOT APPLICABLE

15. REGULATORY INFORMATION

SARA 311 CATEGORIES:	1. Immediate (Acute) Health Effects:	NO
	2. Delayed (Chronic) Health Effects:	NO
	3. Fire Hazard:	NO
	4. Sudden Release of Pressure Hazard:	NO
	5. Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED:

01=SARA 313	11=NJ RTK	22=TSCA Sect 5(a)(2)
02=MASS RTK	12=CERCLA 302.4	23=TSCA Sect 6
03=NTP Carcinogen	13=MN RTK	24=TSCA Sect 12(b)
04=CA Prop 65-Carcin	14=ACGIH TWA	25=TSCA Sect 8(a)
05=CA Prop 65-Repro Tox	15=ACGIH STEL	26=TSCA Sect 8(d)
06=IARC Group 1	16=ACGIH Calc TLV	27=TSCA Sect 4(a)
07=IARC Group 2A	17=OSHA PEL	28=Canadian WHMIS
08=IARC Group 2B	18=DOT Marine Pollutant	29=OSHA CEILING
09=SARA 302/304	19=Chevron TWA	30=Chevron STEL
10=PA RTK	20=EPA Carcinogen	

The following components of this material are found on the regulatory lists indicated.

PHOSPHORODITHIOIC ACID,O,O-DI-C1-14-ALKYL ESTERS, ZINC SALTS
is found on lists: 01,11,
SEVERELY REFINED PETROLEUM DISTILLATE
is found on lists: 14,15,17,

EEC RISK AND SAFETY STATEMENTS:
May cause long-term adverse effects in the aquatic environment.
NEW JERSEY RTK CLASSIFICATION:
Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows:
PETROLEUM OIL
WHMIS CLASSIFICATION:
This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

---

16. OTHER INFORMATION

NFPA RATINGS: Health 1; Flammability 1; Reactivity 0;
HMIS RATINGS: Health 1; Flammability 1; Reactivity 0;
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT:
This is a new Material Safety Data Sheet.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	TPQ - Threshold Planning Quantity
RQ - Reportable Quantity	PEL - Permissible Exposure Limit
C - Ceiling Limit	CAS - Chemical Abstract Service Number
A1-5 - Appendix A Categories	() - Change Has Been Proposed
NDA - No Data Available	NA - Not Applicable

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Toxicology and Health Risk Assessment Unit, CRTC, P.O. Box 4054, Richmond, CA 94804

****

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may

be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

****

THIS IS THE LAST PAGE OF THIS MSDS

****

Lampros

Material Safety Data Sheet

- Click on the product name to go to the Salesfax description sheet.
- Click on the grade to go to the Salesfax typical test data sheet.

HS Diesel Fuel 2 (only grade)

MSDS: 0525 Revision #: 19 Revision Date: 06/03/95

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TARR CODE: HD

HS DIESEL FUEL 2

PRODUCT NUMBER(S): CPS270010 CPS272102 CPS272152 CPS272185

COMPANY IDENTIFICATION

CHEVRON USA PRODUCTS COMPANY
ENVIRONMENTAL, SAFETY, AND HEALTH
ROOM 2900
575 MARKET ST.
SAN FRANCISCO, CA 94105-2856

EMERGENCY TELEPHONE NUMBERS

HEALTH (24 hr): (800)231-0623 or
(510)231-0623 (International)
TRANSPORTATION (24 hr): CHEMTREC
(800)424-9300 or (202)483-7616

PRODUCT INFORMATION: MSDS REQUEST: (415) 894-2783
ENVIRONMENTAL, SAFETY & HEALTH INFO.: (415) 894-1899
Product Information: (510) 242-5357

2. COMPOSITION/INFORMATION ON INGREDIENTS

100.0 % HS DIESEL FUEL 2

CONTAINING

COMPONENTS	AMOUNT	LIMIT/QTY	AGENCY/TYPE
DIESEL FUEL NO. 2 Chemical Name: FUELS, DIESEL, NO. 2 CAS68476346	100.0%	NONE	NA
HDS DISTILLATE, MIDDLE Chemical Name: DISTILLATES, HYDRODESULFURIZED MIDDLE CAS64742809		NONE	NA
GAS OIL, LIGHT Chemical Name: DISTILLATES, STRAIGHT RUN MIDDLE CAS64741442		NONE	NA
KEROSENE Chemical Name: KEROSINE CAS8008206		NONE	NA
HYDRODESULFURIZED KEROSINE Chemical Name: KEROSINE, HYDRODESULFURIZED			

MAR 24 2000

CAS64742810	NONE	NA

CAT CRACKED DISTILLATE, LIGHT
Chemical Name: DISTILLATES, LIGHT CATALYTIC CRACKED

CAS64741599	NONE	NA

COMPOSITION COMMENT:
All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	TPQ - Threshold Planning Quantity
RQ - Reportable Quantity	PEL - Permissible Exposure Limit
C - Ceiling Limit	CAS - Chemical Abstract Service Number
A1-5 - Appendix A Categories	() - Change Has Been Proposed

3. HAZARDS IDENTIFICATION

********** EMERGENCY OVERVIEW **********

Red liquid.

- COMBUSTIBLE
- HARMFUL OR FATAL IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE
- CAUSES SKIN IRRITATION
- CANCER HAZARD
- PROLONGED OR REPEATED SKIN CONTACT MAY INCREASE THE RISK OF SKIN CANCER
- KEEP OUT OF REACH OF CHILDREN

****

POTENTIAL HEALTH EFFECTS
EYE:
This substance is not expected to cause prolonged or significant eye irritation.
SKIN:
This substance is a moderate skin irritant so contact with the skin could cause prolonged (days) injury to the affected area. The degree of injury will depend on the amount of material that gets on the skin and the speed and thoroughness of the first aid treatment. If absorbed through the skin, this substance is considered practically non-toxic to internal organs.
INGESTION:
If swallowed, this substance is considered practically non-toxic to internal organs. Because of the low viscosity of this substance, it can directly enter the lungs if it is swallowed (this is called aspiration). This can occur during the act of swallowing or when vomiting the substance. Once in the lungs, the substance is very difficult to remove and can cause severe injury to the lungs and death.
INHALATION:
Prolonged breathing of vapors can cause central nervous system effects. This hazard evaluation is based on data from similar materials.
SIGNS AND SYMPTOMS OF EXPOSURE:
SKIN: May include pain or a feeling of heat, discoloration, swelling, and blistering. INHALATION: Central nervous system effects may include one or more of following: headache, dizziness, loss of appetite, weakness and loss of coordination.
CARCINOGENICITY:
This product contains a mixture of petroleum hydrocarbons called middle distillates (which means they boil between approximately 350F and 700F).

MAR 24 2000

Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: GAS OIL
DOT HAZARD CLASS: COMBUSTIBLE LIQUID
DOT IDENTIFICATION NUMBER: UN1202
DOT PACKING GROUP: III

15. REGULATORY INFORMATION

SARA 311 CATEGORIES:		
	1. Immediate (Acute) Health Effects:	YES
	2. Delayed (Chronic) Health Effects:	YES
	3. Fire Hazard:	YES
	4. Sudden Release of Pressure Hazard:	NO
	5. Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED:

01=SARA 313	11=NJ RTK	22=TSCA Sect 5(a)(2)
02=MASS RTK	12=CERCLA 302.4	23=TSCA Sect 6
03=NTP Carcinogen	13=MN RTK	24=TSCA Sect 12(b)
04=CA Prop 65-Carcin	14=ACGIH TWA	25=TSCA Sect 8(a)
05=CA Prop 65-Repro Tox	15=ACGIH STEL	26=TSCA Sect 8(d)
06=IARC Group 1	16=ACGIH Calc TLV	27=TSCA Sect 4(a)
07=IARC Group 2A	17=OSHA PEL	28=Canadian WHMIS
08=IARC Group 2B	18=DOT Marine Pollutant	29=OSHA CEILING
09=SARA 302/304	19=Chevron TWA	30=Chevron STEL
10=PA RTK	20=EPA Carcinogen	

The following components of this material are found on the regulatory lists indicated.

KEROSINE
is found on lists: 02,10,11,

16. OTHER INFORMATION

NFPA RATINGS: Health 0; Flammability 2; Reactivity 0;
(Least-0, Slight-1, Moderate-2, High-3, Extreme-4). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT:
This revision updates Section 1 (Chemical Product and Company ID).

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Toxicology and Health Risk Assessment Unit, CRTC, P.O. Box 4054, Richmond, CA 94804

****

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

NDA - No Data Available NA - Not Applicable

****

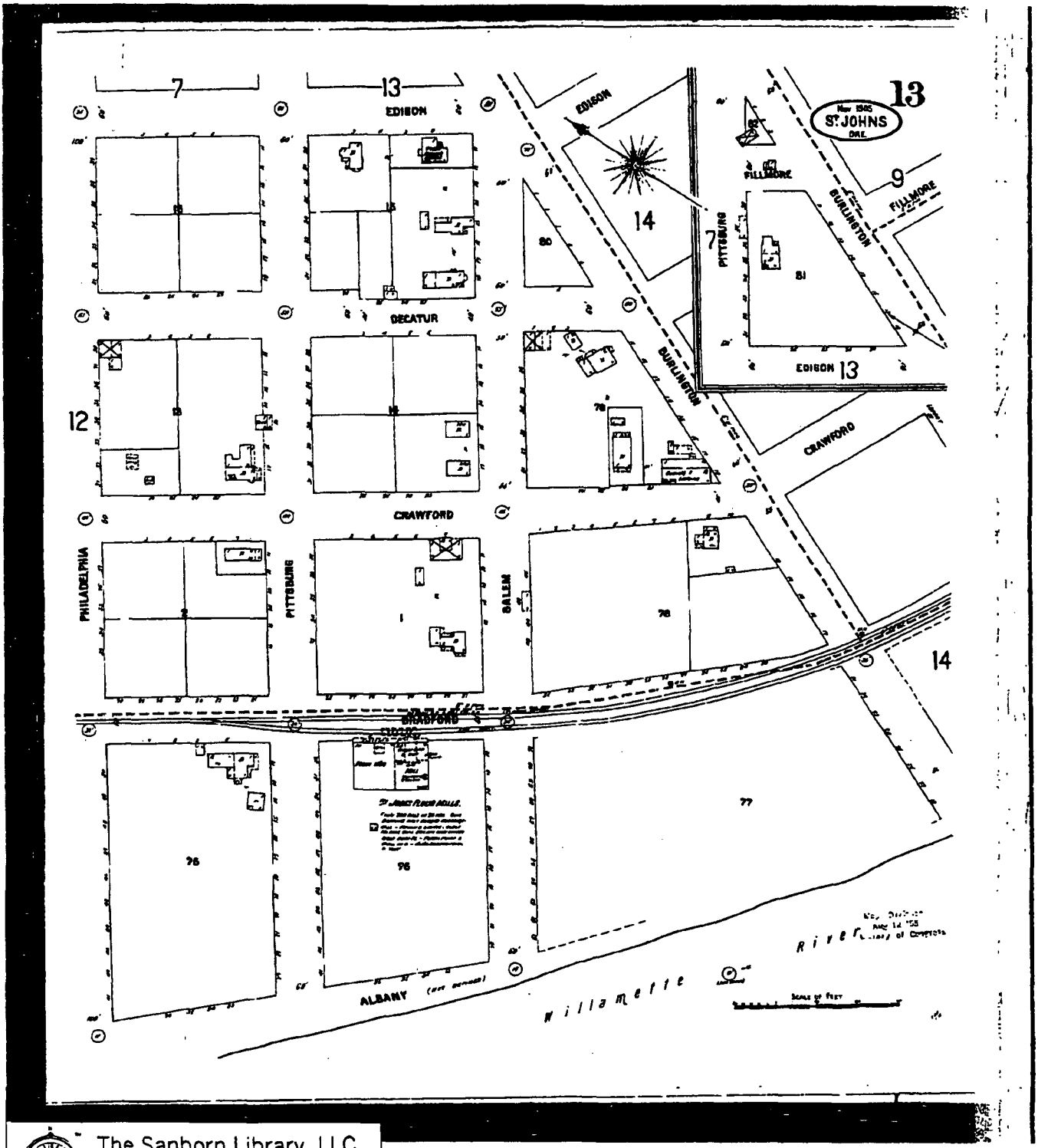
THIS IS THE LAST PAGE OF THIS MSDS.

****

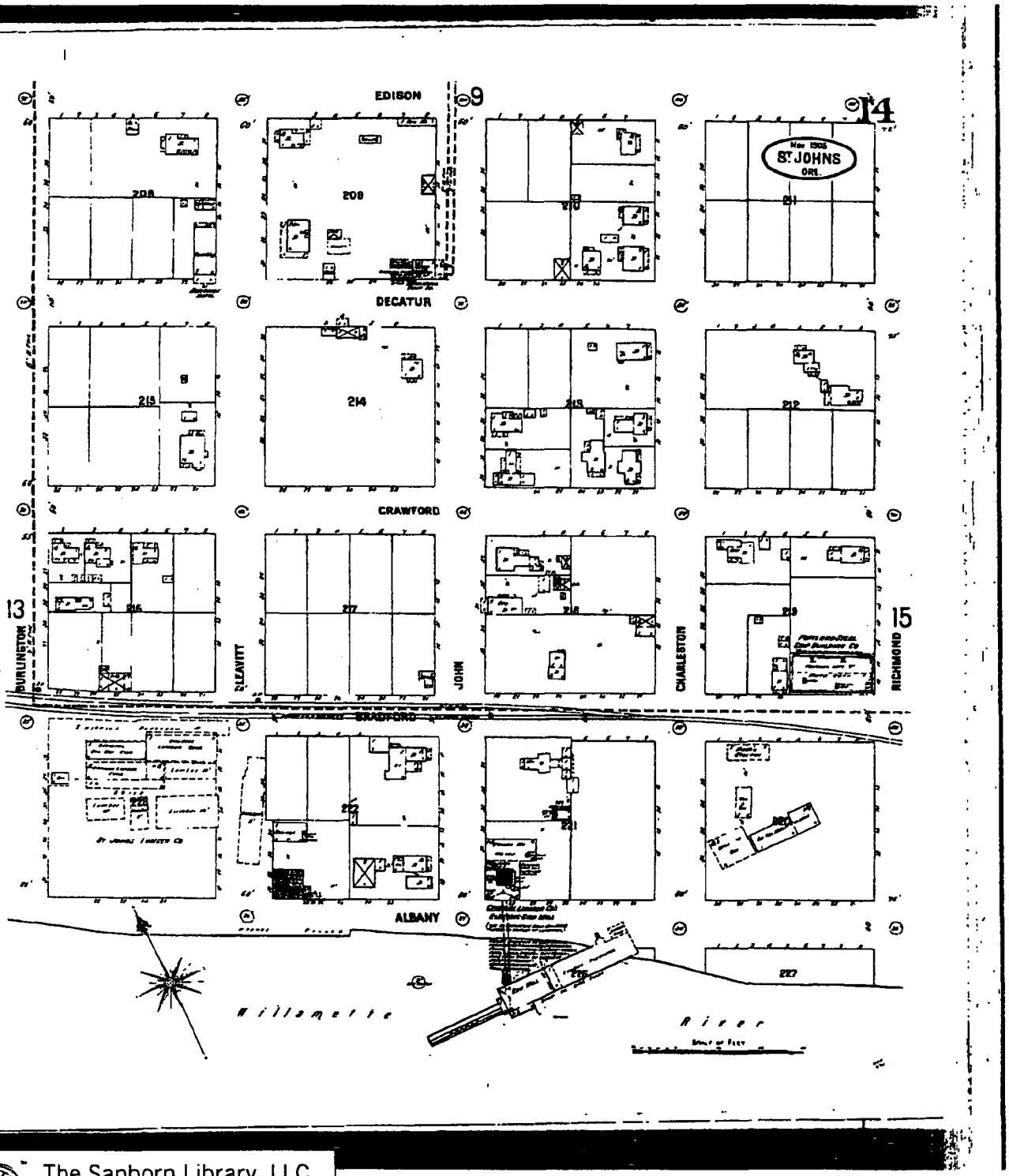
Appendix C

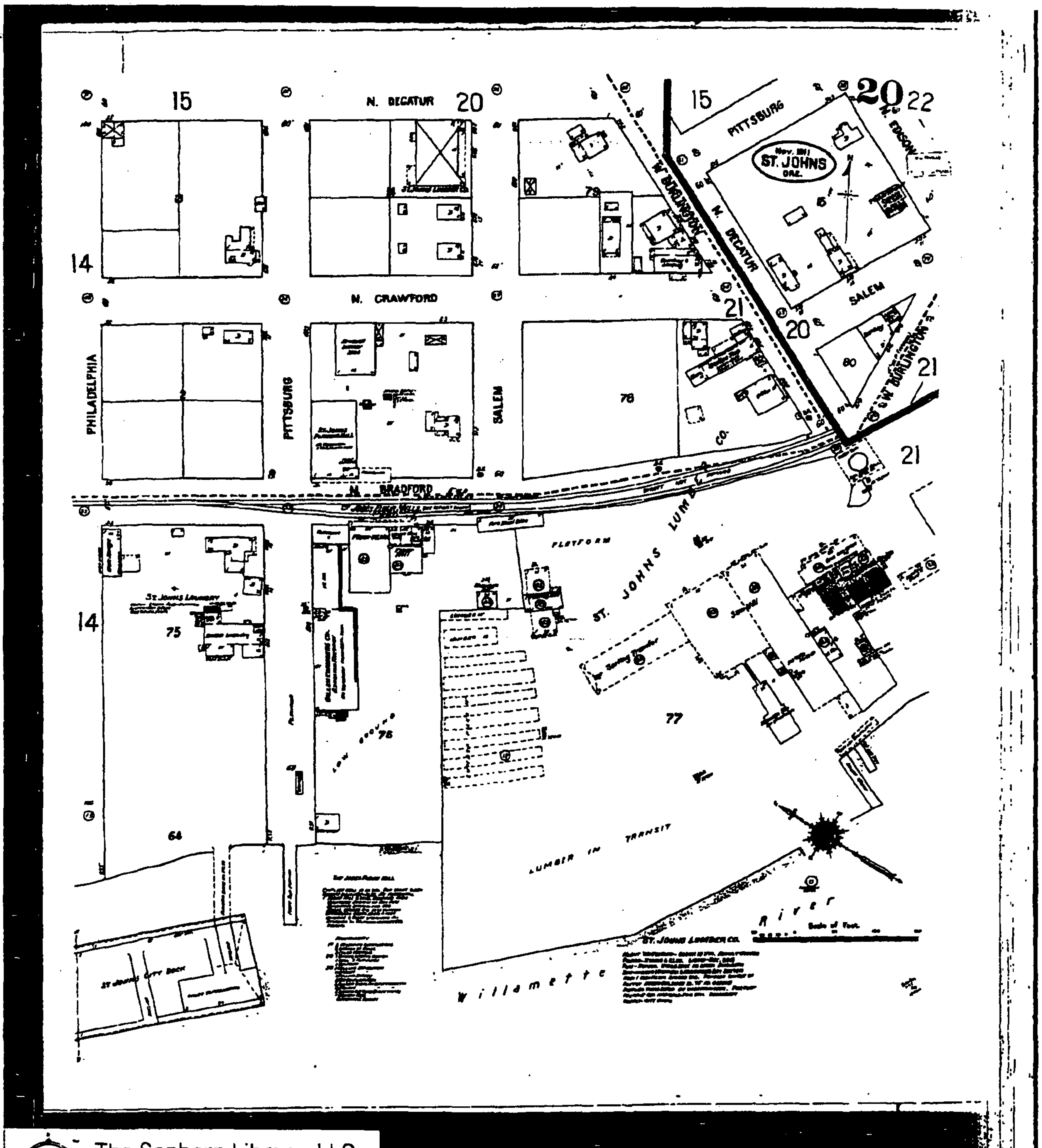
APPENDIX C

SANBORN FIRE INSURANCE MAPS

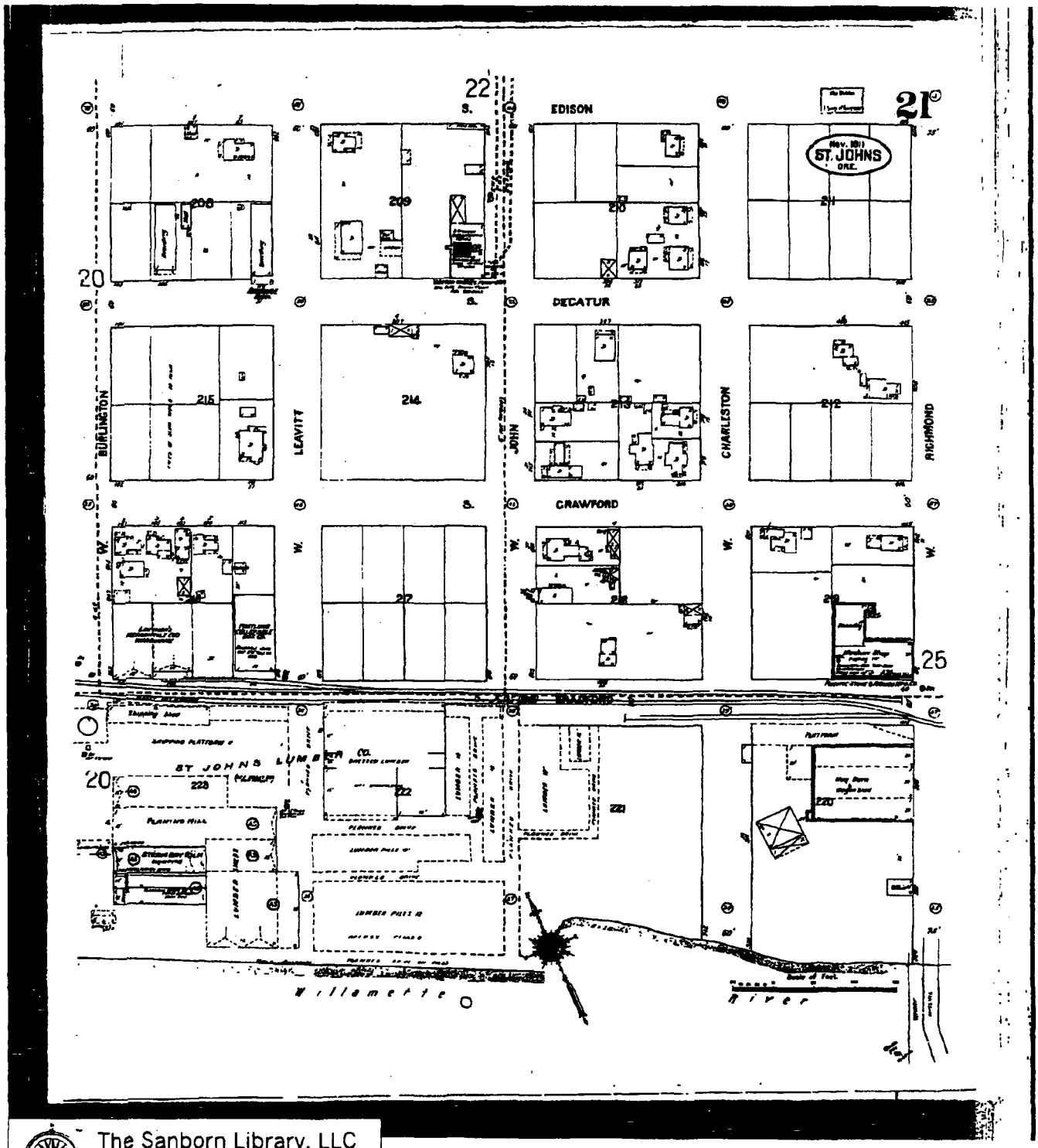


The Sanborn Library, LLC

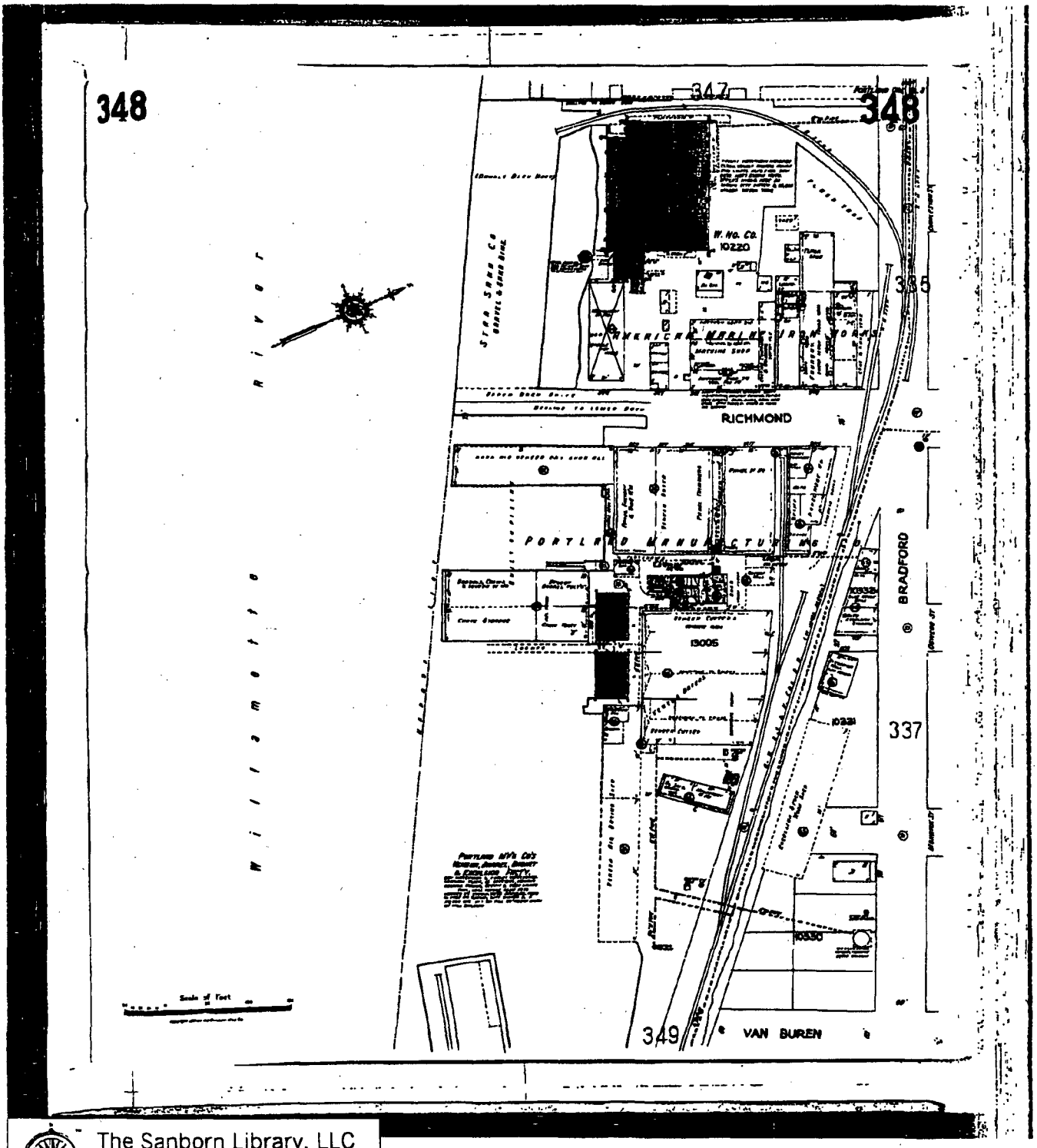


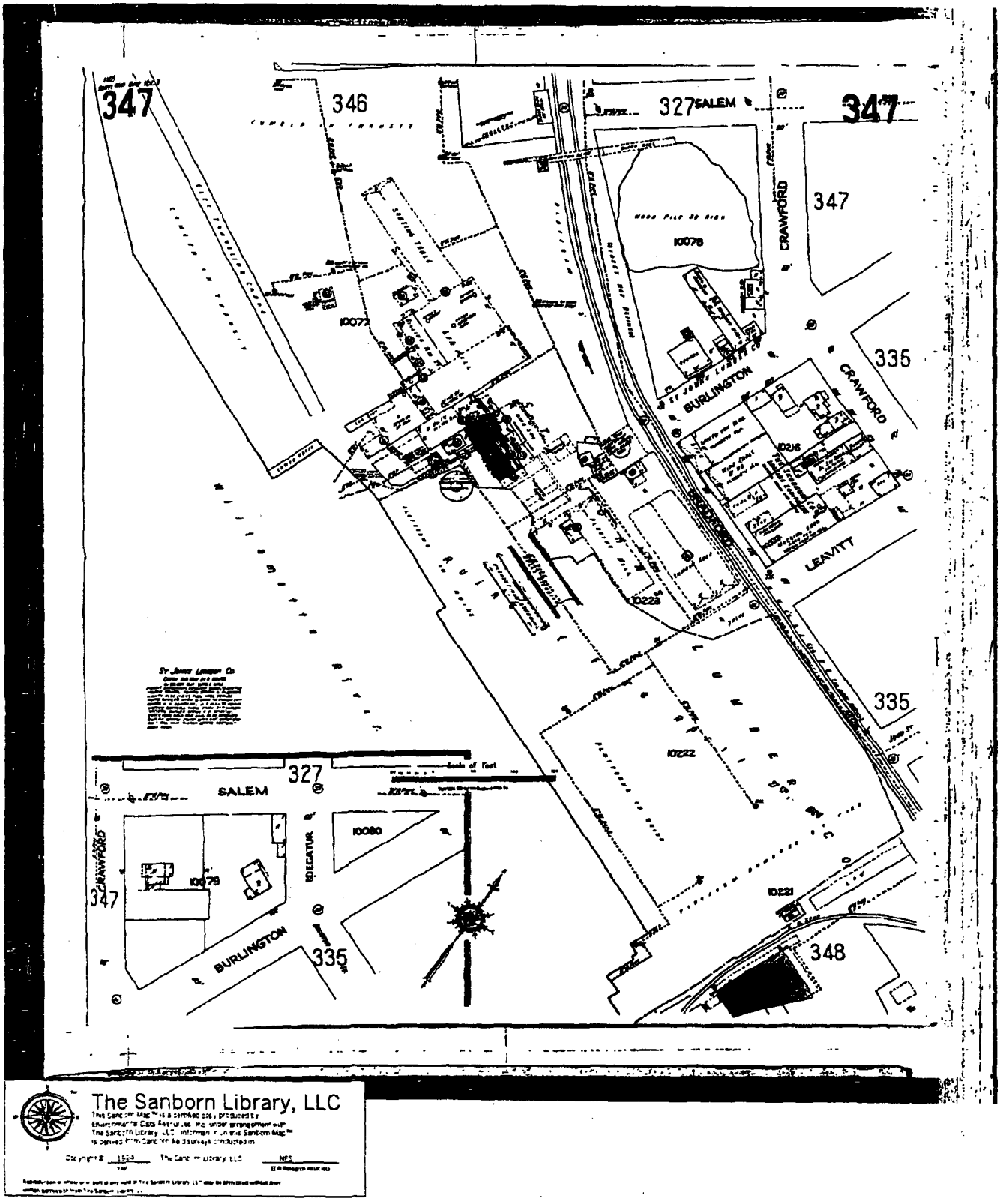


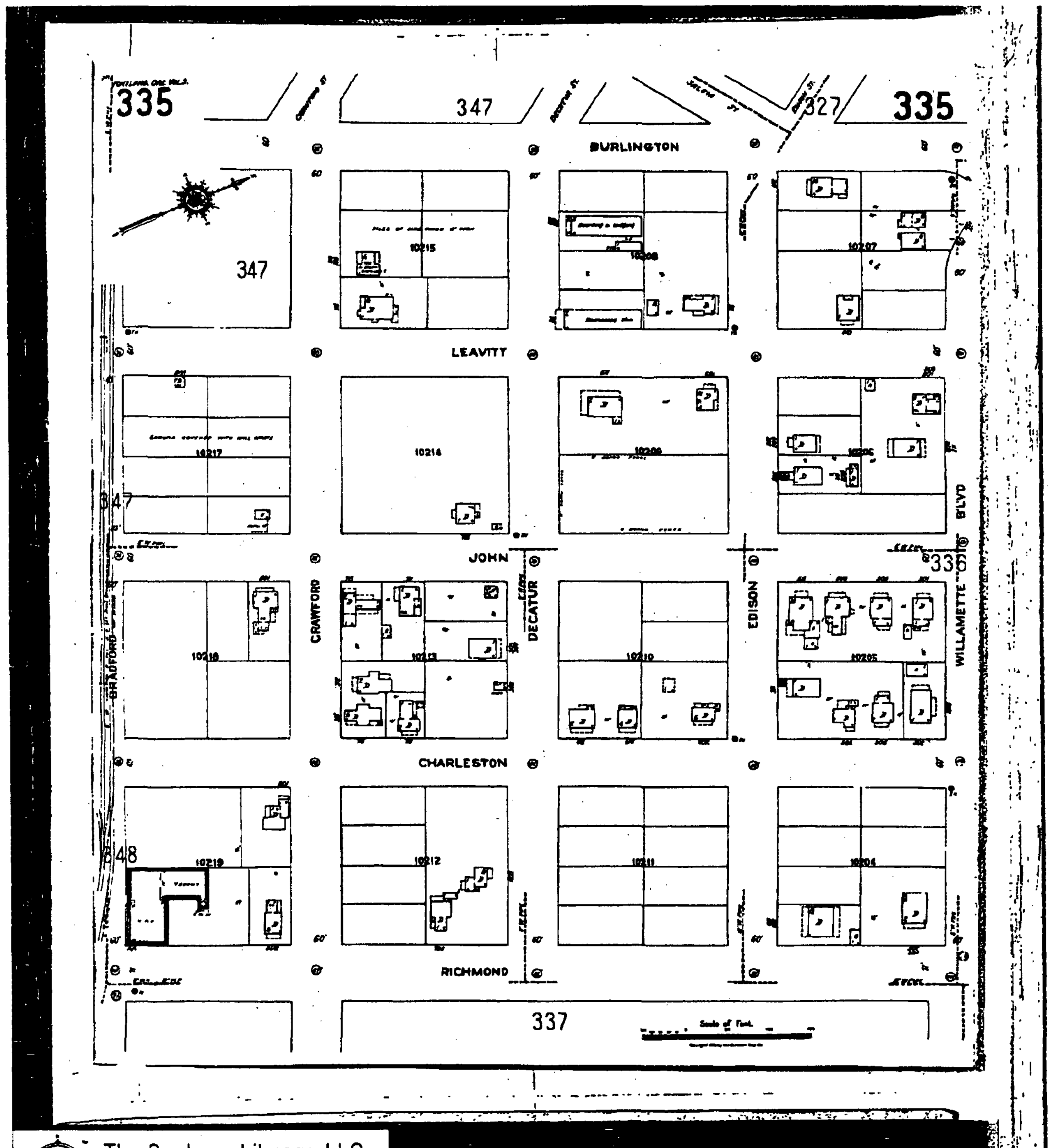
CRAWA00004687



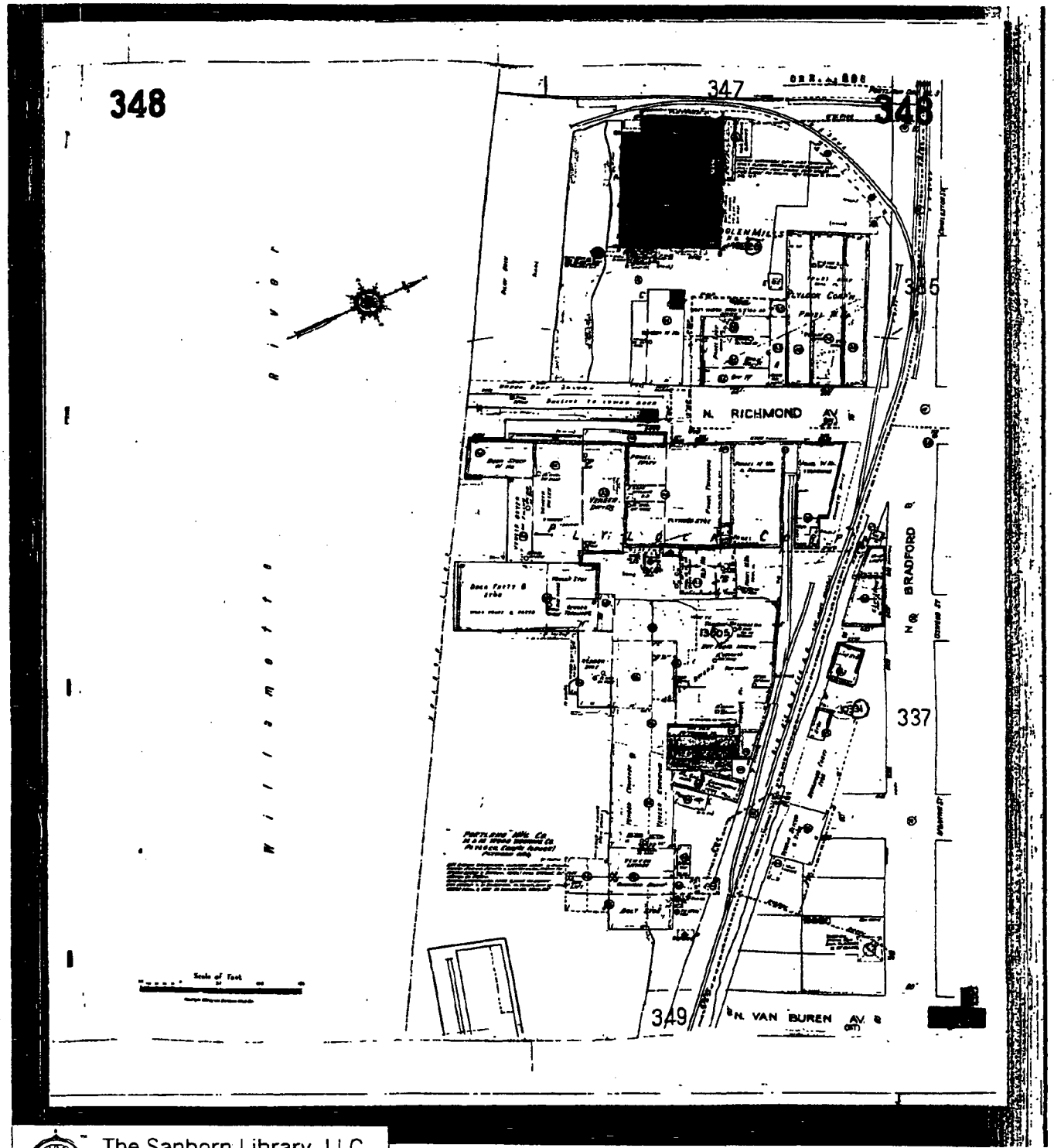
The Sanborn Library, LLC

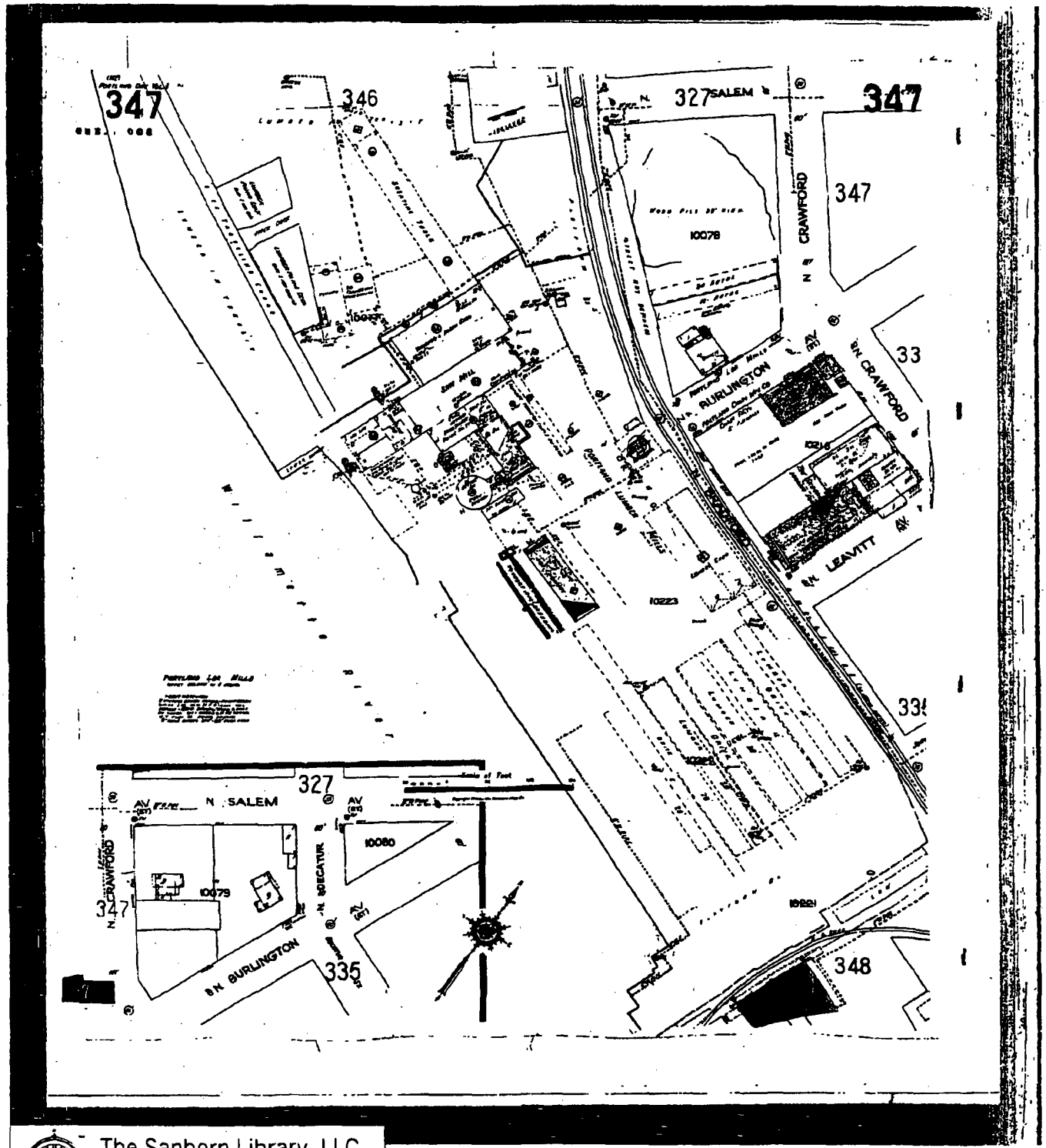


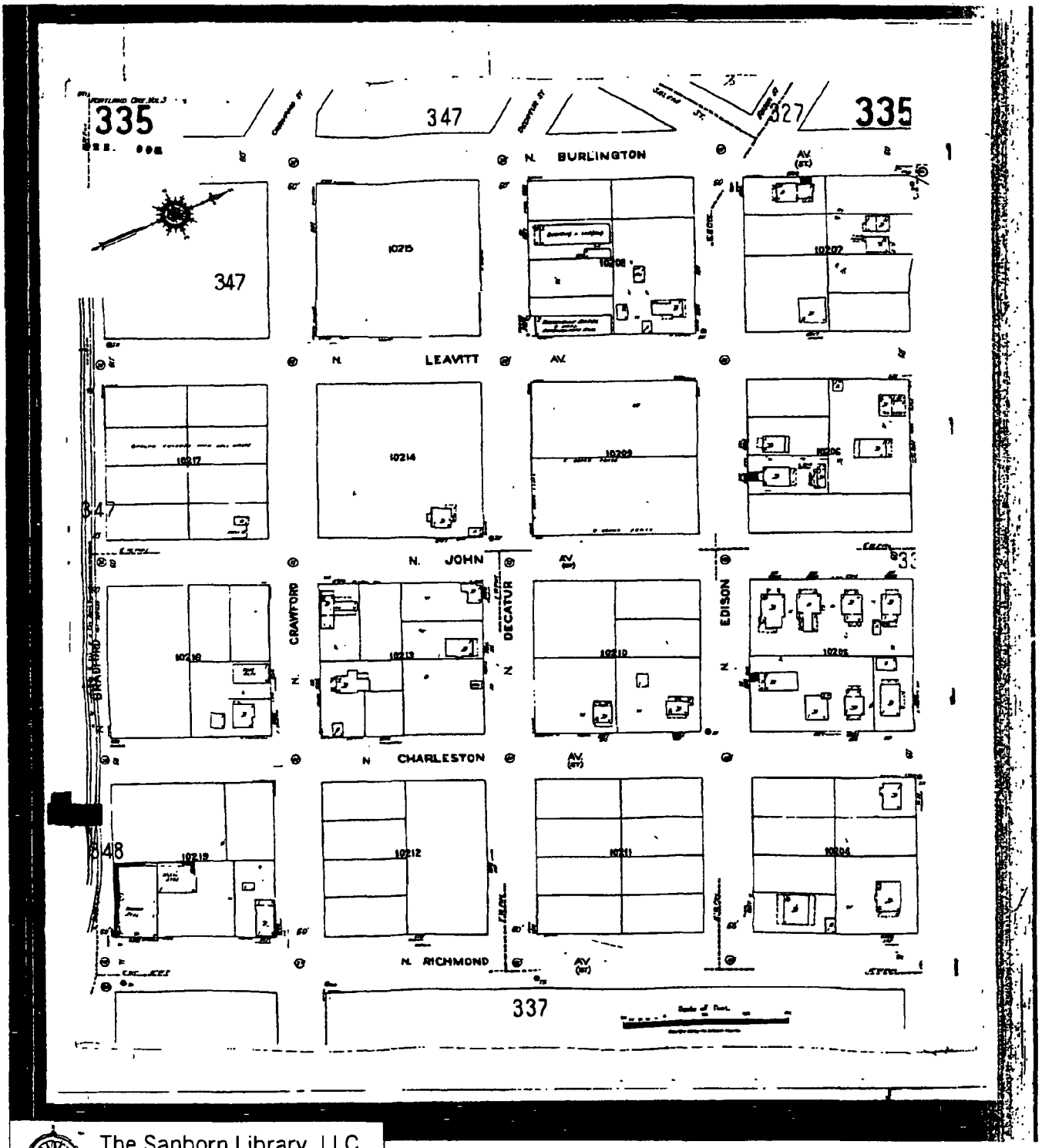

347
346
327
SALEM
347
347
CRAWFORD
10078
10077
335
BURLINGTON
CRAWFORD
10076
LEAVITT
10225
335
10222
327
SALEM
10080
DECATUR
10079
347
BURLINGTON
335
10221
348
The Sanborn Library, LLC

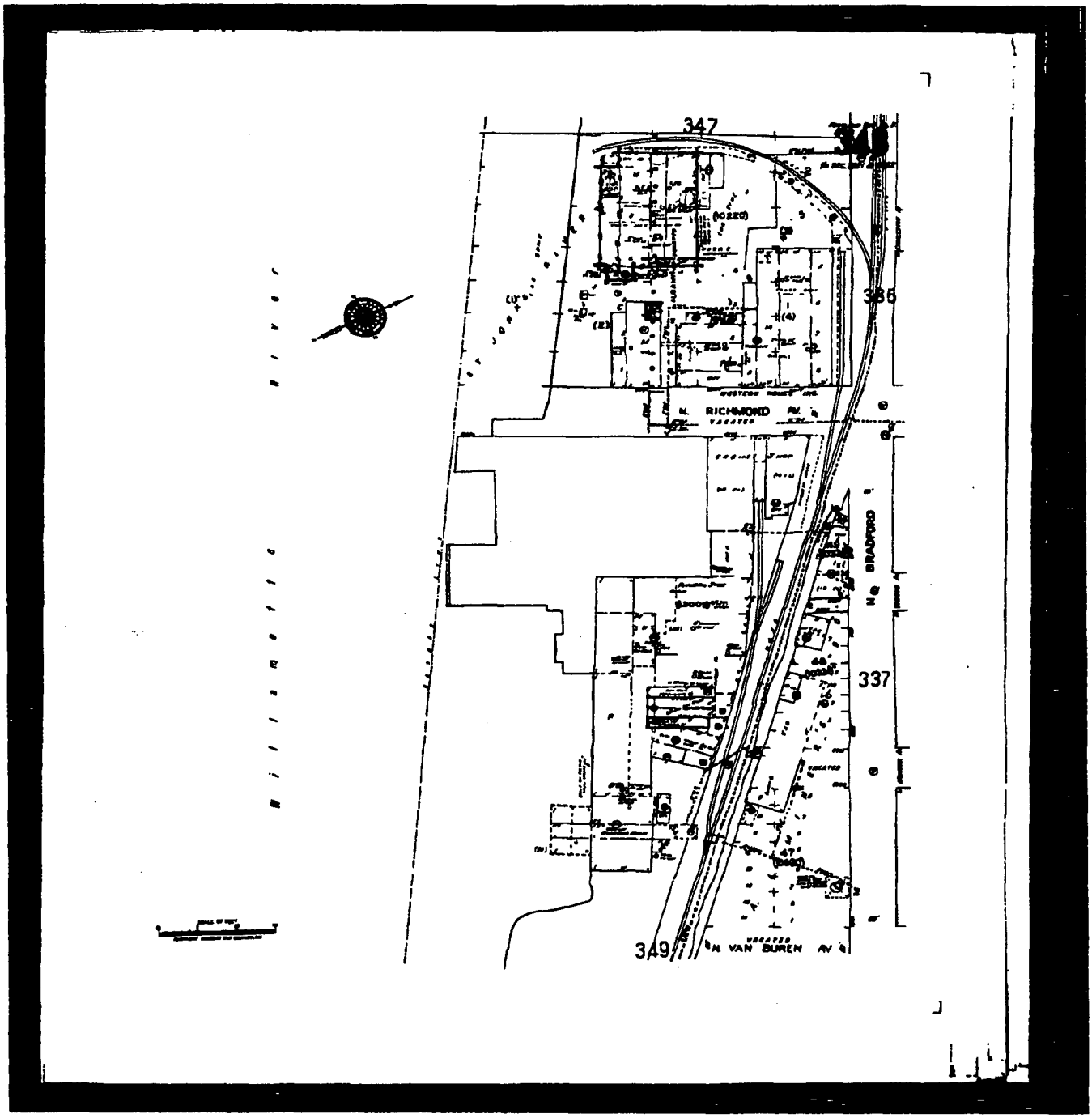


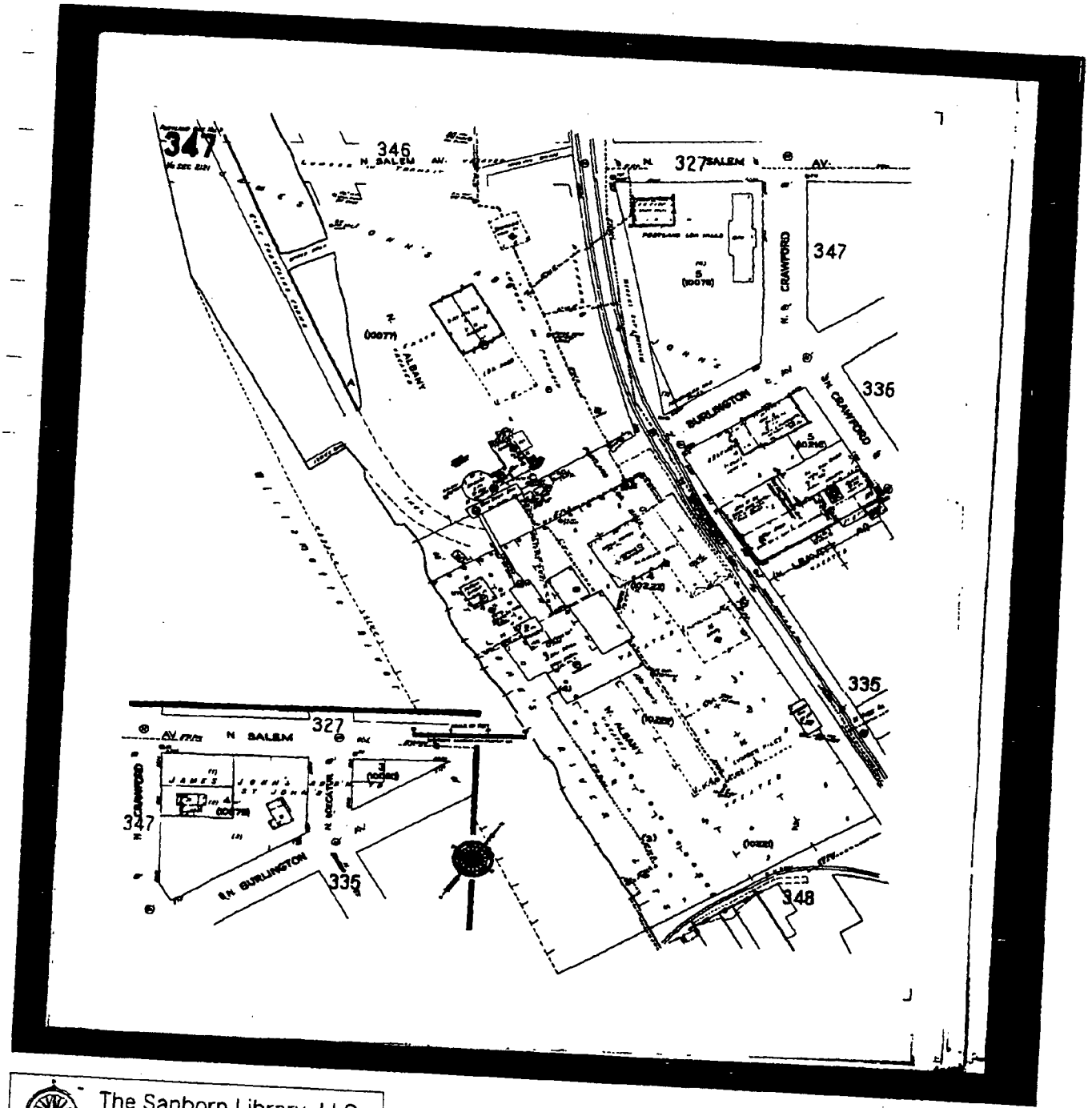
CRAW00004691



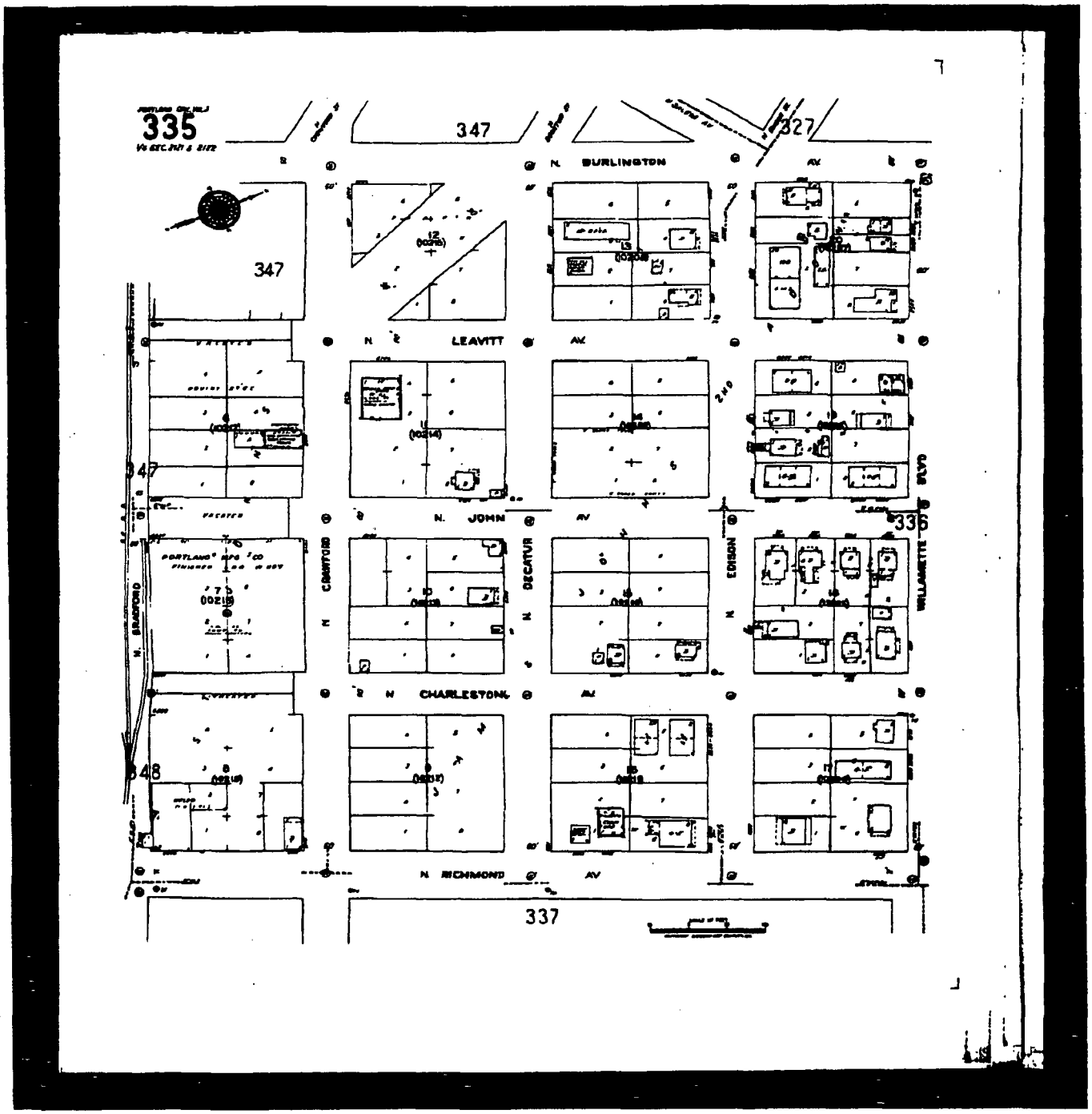








The Sanborn Library, LLC



Appendix D

APPENDIX D

APRIL 4, 1988, SWEET EDWARDS/EMCON REPORT FOR PROPOSED MANUFACTURING MANAGEMENT INC. SITE, (LAMPROS STEEL)

ENVIRONMENTAL EVALUATION
PROPOSED MANUFACTURING MANAGEMENT, INC. SITE
(LAMPROS STEEL)
ST. JOHNS DISTRICT, PORTLAND, OREGON

April 4, 1988

Submitted To Attorneys For:

Manufacturing Management, Inc.
4927 NW Front Avenue
Portland, Oregon 97210

Submitted By:

Sweet-Edwards/EMCON, Inc.
P.O. Drawer B
Kelso, Washington 98626

T2401.02

TABLE OF CONTENTS

	Page No.
INTRODUCTION	1
PURPOSE	1
SCOPE OF WORK	1
SITE DESCRIPTION	2
TOPOGRAPHY AND DRAINAGE	2
GEOLOGY/HYDROGEOLOGY	3
PRESENT-DAY SITE ACTIVITIES	3
SITE HISTORY	3
POTENTIAL CONTAMINANT SOURCES	5
ONSITE SOURCES	5
Sand Fill	5
Suspected Underground Storage Tank Pipes	6
Possible Unknown Underground Storage Tanks	6
Drainfield	6
OFFSITE SOURCES	6
Union Pacific Railroad (UPRR) Pipeline	7
Former Underground Storage Tanks, Asset Recovery and Columbia Forge	7
St. Johns Truck and Equipment Repair	8
Oil-Contaminated Soil; Railroad Tracks and Columbia Forge	8
Compressor Blowdown, Columbia Forge	9
FIELD INVESTIGATION	9
ORGANIZATION	9
SURFACE GRAB SAMPLES OF SAND FILL	9
RIVER BLUFF TRAVERSE	10
SUSPECTED UNDERGROUND STORAGE TANK PIPES	10
GEOPHYSICS SEARCH	10
TEST DRILLING AND GROUND WATER SAMPLING	11
Drainfield Area	11
Sand-Fill Area	12
TEST PIT EXPLORATION	12
Geophysical Targets	12
Sand-Fill Area	13
Underground Storage Tank at Test Pit 2	14
RESULTS OF FIELD INVESTIGATION	16
SAND-FILL GRAB SAMPLES; EP TOXICITY TESTING	16
SUSPECTED UNDERGROUND STORAGE TANK PIPES	16
GROUND WATER SAMPLES	16
TEST PIT 7 SOIL SAMPLES	17
UNDERGROUND STORAGE TANK AT TEST PIT 2	17

TABLE OF CONTENTS, continued

Page No.

CONCLUSIONS 19

LIMITATIONS 20

REFERENCE 20

TABLES
(following text)

1 Information Sources
2 U.S. Army Corps of Engineers Aerial Photographs Reviewed for Historical Land Uses
3 List of Past Onsite Property Ownership by Businesses
4 Test Pit Descriptions

FIGURES
(following text)

1 Location Map
2 Block and Lot Locations
3 Site Map
4 Test Pit, Reconnaissance Test Borings, Sand Fill Area Locations
5 Cross Section, Test Pit 7, Sand Fill Area
6 Tank Excavation Cross Section
7 Plan View, Tank Excavation

APPENDICES
(following text)

1 Notification Forms and Laboratory Test Results, Asset Recovery/Columbia Forge Underground Storage Tanks
2 Sampling Methods
3 Boring Logs
4 Ground Penetrating Radar Survey, Williamson and Associates Report
5 Electromagnetic (EM) Induction Survey, Geo-Recon Report
6 Laboratory Report, Soil and Ground Water Testing

INTRODUCTION

PURPOSE

Attorneys for Manufacturing Management, Inc. (MMI) commissioned Sweet-Edwards/EMCON (SE/E) to conduct an environmental audit of an industrial property in the St. Johns district of Portland, Oregon, for the purposes of preparing a legal opinion and to determine if onsite soil and/or ground water contamination existed because of past onsite or nearby offsite activities. Figure 1 shows the location of the site.

SCOPE OF WORK

Work began with an initial reconnaissance visit to the site on November 10, 1987. After that visit, a work scope and cost proposal were prepared and submitted on November 13, 1987 to N. Webb (MMI). The proposal addressed a documents search and review of historical aerial photography. The purpose of the search/review was to document activities that may have affected soil and/or ground water quality at the site. Work began on the search/review on December 10, 1987. Table 1 lists information sources used to document site-area activities and conditions. Table 2 lists the aerial photographs that were examined to partly reconstruct the site's history.

Physical features observed onsite and information developed during the search/review suggested that underground storage tanks may have been present at the site. Two other concerns were also identified. Part of the site was covered with angular, black medium to coarse sand. The sand had been placed as fill in an

area where a building had been demolished. The chemical characteristics of the sand were unknown, as were its potential impacts on soil and ground water. Also, a former building had been served with a private septic tank and drainfield. Potential impacts to ground water beneath the drainfield were unknown.

The search/review process thus evolved into 1) exploring for underground storage tanks, 2) field sampling of soil and ground water in specific "target" areas and 3) laboratory testing of soil and ground water to determine the extent of potential contamination. This report describes the site history as developed from the search/review, and goes on to describe the methods and results of the field program.

SITE DESCRIPTION

TOPOGRAPHY AND DRAINAGE

The site is L-shaped (Figure 1), most of it being in a rectangular area occurring as a bench about 20 to 30 feet above the Willamette River. The rectangular area is approximately 400 by 1000 feet. The "foot" of the L-shaped area is at the eastern end of the site and lies on a gentle southwest-facing slope that rises to an elevation of 50 to 60 feet mean sea level (MSL). The "foot" is approximately 150 by 250 feet. A warehouse building is on its western end. The entire site drains to the Willamette River, the major stream in the site area. There are no surface drains or streams that drain the site directly to the river.

GEOLOGY/HYDROGEOLOGY

The site was mapped as being underlain by Willamette River deposits (Trimble, 1963), but exposures along the bluff overlooking the river forming the site's southern boundary suggest the bench portion of the site is immediately underlain by 20 feet of manmade fill. The river deposits and their veneer of fill are inset against older river deposits. The older river deposits extend to elevations below present sea level, where they overlie gravels of the upper part of the Troutdale Formation. The Troutdale is the most productive aquifer in the St. Johns area. However, its upper gravels occur at roughly elevation -100 feet MSL in the St. Johns area. The aquifer is probably not used near the site area because 1) no records exist at the Oregon Water Resources Department for wells near the site area and 2) the area is served by City of Portland drinking water.

PRESENT-DAY SITE ACTIVITIES

There are no present activities at most of the site. It has been vacated. The warehouse present in the "foot" is used by the Portland Development Commission (PDC) for storage.

SITE HISTORY

Review of title records supplied by N. Webb (MMI) shows that the site has been industrialized since the late 1800s. Table 3 partially lists past ownership through the 1960s-late 1970s of the blocks that comprise the site. Figure 2 shows the locations

of the blocks. The past owners listed in Table 3 are only those having business names. Individual owners are not listed. The business names permit broad inferences to be drawn concerning the nature of past onsite business activities.

Most businesses were lumber mills. Other businesses were warehousing and unknown manufacturing and possible shipbuilding work. The latter is suggested by the name "Marine Iron Works" in the title records.

U.S. Army Corps of Engineers photographs (Table 2) document site activities since 1936, the earliest year of photographic coverage. Mill buildings occupied parts of the site since at least 1936. From 1936 to the early 1950s, buildings were present in the eastern end of the main, rectangular part of the site. They were part of a plywood plant complex, most of which was offsite east of North Richmond Avenue. Building "7" (Figure 3) was one of these buildings. It was used variously for wool scouring, plywood storage, and most recently, by "Fibron Insulation" in the late 1970s-early 1980s. Other buildings were also present in the area between building "7" and the river.

A planing mill, sawmill and chip bin had been built by the early 1950s at the western end of the main site area (Buildings "4", "5", "6"; Figure 3). The present PDC warehouse had been built by 1961. By 1973, portions of the mill complex were being dismantled, beginning in the eastern half of the main area. The planing mill and sawmill at the west end of the main area were torn down during 1977-1978 by the last business to operate them, Brand S Corporation. The "Fibron" building was still standing in 1983, but was torn down by 1986, only its foundation remaining. The PDC warehouse is the only remaining onsite structure.

A site visit and interview with a former employee of the former sawmill provided additional detail concerning site history. The former employee provided critical information about two areas at the site. First, the former "Fibron" building had been served by a private septic tank and drainfield that lay between that building and the river.

The second key piece of information concerned the sand that had been placed as fill in the area where the former sawmill (Figure 3, Building "6") had stood. The former employee explained that the sand was placed during demolition of the sawmill in 1977-1978. The former sawmill got the sand from a local sandblasting company. The sand had been used to clean oil tanks on land and in ships. When the sand was placed as fill, it was oily. Winter rains flushed oil from the sand and oily water ran into the Willamette River, creating an oil slick. The Coast Guard warned the sawmill owner and no more sand was placed as fill. The oil slick eventually disappeared.

POTENTIAL CONTAMINANT SOURCES

ONSITE SOURCES

Sand Fill

The sandblast sand placed in the area of the former sawmill created an oil slick on the Willamette River when it was placed in the winter of 1977-78. Residual oil may still locally be present in the sand. The chemical character of the oil is unknown. The oil may be contaminated with solvents or PCBs. Oil

is regulated as a hazardous substance under the new Oregon "Superfund" law, ORS 466.540(9).

Suspected Underground Storage Tank Pipes

Six pipes project vertically out of the ground or out of former floor slabs at the former planing mill and sawmill sites. The pipes range in inside diameter from 6 to 8 inches. All were capped by steel plates secured to flanges with bolts. The purpose of the pipes was unknown. They may have been fill or distribution pipes for underground fuel storage tanks.

Possible Unknown Underground Storage Tanks

Because the site is so large and has been the scene of so many different industrial businesses for essentially 100 years, it was felt by N. Webb (MMI) and SE/E that underground storage tanks probably existed somewhere onsite.

Drainfield

The former "Fibron" building was served by a local septic tank and drainfield. The nature of that building's drain-piping system is unknown. It is possible that chemical spills may have been discharged to the drainfield along with "domestic" sewage.

OFFSITE SOURCES

Union Pacific Railroad (UPRR) Pipeline

Figure 3 shows the location of an eight-inch pipeline operated by UPRR. The pipeline carries diesel according to Ted Haskill (UPRR). It runs down the middle of North Crawford Street and so is in the presumed upgradient direction for ground water flow with respect to the site. If the pipe has leaked, it would be an upgradient source of diesel.

Former Underground Storage Tanks, Asset Recovery and Columbia Forge

Three tanks were present at Asset Recovery and Columbia Forge along North Crawford Street. Figure 3 shows their former locations. One diesel tank was at Asset Recovery, whereas two tanks, one gasoline and one diesel, were at Columbia Forge. The tanks were removed in March 1987. Appendix 1 contains information on the tanks submitted to the Oregon Department of Environmental Quality (DEQ).

Samples were taken of 1) soil beneath the tanks and 2) the tanks' contents. The test results are in Appendix 1. The gasoline tank at Columbia Forge reportedly had a small hole in it. Soil from beneath the gasoline tanks contained 16 mg/kg gasoline, <1 mg/kg diesel and 30 mg/kg lead. The meaning of the lead sample is uncertain because another soil sample from beneath the tank was tested at <0.1 mg/kg of lead using the EP Toxicity test. The greater value of 30 mg/kg may be due to a different extraction procedure having been used. Allowing for this uncertainty, the other results still suggest that the tank had evidently leaked.

The time of the leak is uncertain because the tank had been empty since 1960 according to information filed with DEQ.

St. Johns Truck and Equipment Repair

This business at 8435 North Crawford Street is directly across from Columbia Forge and, like the UPRR diesel pipeline, is upgradient of the site with respect to ground water flow. One fuel pump is visible at the west side of the repair shop. It presumably serves an underground tank holding gasoline or diesel. No information exists at DEQ on the probable tank.

A second potential contaminant source exists at this business. It is a large metal box in which truck equipment is placed for steam cleaning. The condensate runs into a drain. Where the water drains to is unknown. The condition of the drain piping is unknown.

Oil-Contaminated Soil; Railroad Tracks and Columbia Forge

Two main buildings comprise the Columbia Forge operation. The westernmost building was formerly used by Skookum, a logging equipment manufacturer. The eastern part of that building contained a paint shop. The shop was cleaned by hosing the floor with water. The water ran into a drain that ran out to the southeastern corner of the building and onto ground just north of railroad tracks that are south of the building (Figure 3, location "D").

Oil was carried with the water, resulting in oil seeping into the ground where the drain discharged near the tracks. The affected area is at least 10 feet wide by several tens of feet long. When it rains, stormwater runoff is carried to the area by the drain and a large puddle forms. Oil moves out of the soil and forms an oil slick on the puddle.

Compressor Blowdown, Columbia Forge

An air compressor is located outside the east wall of the easternmost building at Columbia Forge (Figure 3, location "E"). Oil has been blown out from the compressor onto the ground surface south of the plant building.

FIELD INVESTIGATION

ORGANIZATION

Seven discrete work elements, some with subelements, comprised the field investigation. They are described below in the order in which they were performed.

SURFACE GRAB SAMPLES OF SAND FILL

Three samples of the sand fill were taken at the ground surface on November 10, 1987. They were combined into one composite sample to test whether the sand had the characteristics of an Environmental Protection Agency (EPA) characteristic waste as

determined by the EP Toxicity test. Figure 3 shows the locations of the samples that were combined into the composite test sample.

RIVER BLUFF TRAVERSE

The bluff overlooking the Willamette River was traversed on December 11, 1987 to search for possible springs or seeps. No seeps or springs of ground water or chemical products were observed.

SUSPECTED UNDERGROUND STORAGE TANK PIPES

Four of the suspected fill/distribution pipes were sampled on December 21, 1987. All six pipes were opened, but only four contained enough water to sample. The sampling procedure is described in Appendix 2. Water in the pipes was slightly rusty. Thin, discontinuous oil films were present on the water in two pipes. The pipes were not fill pipes. They did not go straight down into tanks, but instead became horizontal about 2 feet below ground surface.

GEOPHYSICS SEARCH

Geophysical techniques were used to search for possible underground storage tanks in the main area of the site. No geophysical exploration was done in the "foot" area because heavy brush there prevented access. A ground-penetrating radar survey was attempted on December 26, 1987 by Williamson and Associates (Seattle, WA) under SE/E's direction. However, the attempt

failed. Reasons for the failure are discussed in Williamson and Associates' report in Appendix 4.

An electromagnetic (EM) induction survey was run on December 27, 1987 by Geo-Recon (Seattle, WA) under SE/E's direction. Geo-Recon's report is in Appendix 5. The EM survey identified several electrically conductive targets that might have been underground tanks or piping. The targets were marked on the ground with spray paint at the time of their detection. The actual presence or absence of underground tanks was confirmed later by digging.

TEST DRILLING AND GROUND WATER SAMPLING

Drainfield Area

One test boring was drilled on January 4, 1988 in the general area of the former "Fibron" building's drainfield for the purpose of determining if shallow ground water in that area had been affected by the drainfield. The boring is named T-1. Figure 3 shows T-1's location. Appendix 2 describes 1) boring and sample nomenclature and 2) drilling and sampling methods. T-1's boring log is in Appendix 1.

Total depth of T-1 was 41 feet. Ground water was found at depth 34 feet. A sample of ground water was taken within the upper few feet of the saturated zone.

Sand-Fill Area

One test boring, T-2 (Figure 3), was drilled on January 4, 1988 in the center of the area of thickest (as judged by nearby bluff exposures) sand fill to determine if oil contamination from the sand fill had penetrated underlying materials, perhaps reaching ground water. Appendix 3 contains T-2's boring log.

Total depth of T-2 was 44.5 feet. Ground water was encountered at depth 32.4 feet. The sand fill extends to an approximate depth of 6 feet. Other fill materials are interpreted as occurring from 6 to 20 feet, below which are river deposits of sand and clayey silt. No evidence of oil, oily water or oil-stained soil was observed. Two samples of ground water were taken from the upper part of the saturated zone.

TEST PIT EXPLORATION

Geophysical Targets

Seven test pits were dug on January 6, 1988 to investigate EM-identified targets. The pits were dug using a rubber-tired John Deere 410 backhoe equipped with a 36-inch smooth bucket. The backhoe and operator were from John L. Jersey Excavating (Portland, OR). All but one of the targets were pieces of scrap metal or nails in boards. The remaining target was explored by digging test pit (TP) 2 (Figure 3). A steel tank was found in TP-2 at depth 4 feet. The tank was not completely exposed at the time it was found. Digging was confined only to confirming the presence of the tank. TP-7 and all other test pits were

immediately backfilled with the material dug from them and were loosely compacted using the backhoe's bucket.

Sand-Fill Area

Test pits 6, 7, 8, 9, 10 and 11 were dug in the sand fill at the former sawmill. Figure 4 shows the pits' locations with respect to 1) the overall fill area and 2) the area of thickest sand fill. The pits were dug to determine 1) the thickness of the sand and 2) if any residual oil saturation of the sand existed. Table 4 describes general material types found in test pits 6-11.

All pits but TP-7 were dry. In TP-7, the upper 3 feet consisted of dry sand fill. Mixed sand fill, silt and chaotic jumbles of lumber occurred from 3 to 6 feet (Figure 5). Gray clayey silt was encountered from 6 to 6.5 feet, the final depth of TP-7.

Voids existed between pieces of lumber. While the pit was being opened between depths 3 and 6 feet, water was released from some voids and drained into the pit's bottom. The water had a thin oil slick on it, smelled strongly of oil and had a brownish white foam.

organic odor from deteriorating wood?

Two soil samples were collected from TP-7. Sample S-1 was of dry sand fill at depth 3 feet. Sample S-2 was of gray clayey silt at depth 6 feet. Sample S-2 was wet and oily.

Underground Storage Tank at Test Pit 2

With PDC's advance approval, MMI contracted with Crosby and Overton (C&O) (Portland, OR) to remove the underground tank discovered at TP-2. R. Paul of C&O met with R. Bunker (SE/E) at the site on January 8, 1988 to be shown where the tank was located. C&O reopened the excavation and sampled the tank's contents. C&O submitted the sample to Northwest Testing Laboratories (Portland, OR). However, SE/E took the sample from Northwest Testing on January 11, 1988 at N. Webb's (MMI) request and resubmitted it to Columbia Analytical Services (Longview, WA). The sample was of oil. It was tested for 1) PCBs, 2) benzene, 3) toluene, 4) ethyl benzene, 5) total xylene, 6) total tetrachlorophenol, 7) pentachlorophenol, 8) total organic halogens (TOX), 9) EPA Priority Pollutant metals, 10) total suspended solids, 11) percent water and 12) the EPA characteristic waste categories of corrosivity, ignitability and reactivity. The test results are in Appendix 6 (report dated January 21, 1988). The tests were done to determine if the oil was a hazardous waste. It was not; and arrangements were made by C&O to dispose of the oil at Merit Oil (Portland, OR).

The tank and its contents were removed on January 18, 1988. A representative from SE/E watched C&O perform the removal. A representative of the PDC also observed the removal. A Komatsu PC 2000 trackhoe reopened the excavation and exposed the top of the tank. The contents were pumped into a C&O vacuum truck and later transferred to 55-gallon drums for temporary storage at Columbia Forge at N. Webb's instructions to C&O. Approximately 1550 gallons of oil was removed. The tank's dimensions were 12.5 feet long and about 5.8 feet wide. Its capacity was estimated by

C&O at 2500 gallons. Figure 6 shows a cross-sectional view of the tank in the excavation dug to remove it.

After the tank had been emptied and removed from the ground, the trackhoe was used to scrape away one foot of soil that had immediately underlain the tank. The trackhoe bucket was then used to sample soil at two locations at that horizon. Figure 7 shows the sample locations. These samples were named Tank 1 and Tank 2, "Tank" indicating that the soil sample was from the tank excavation. These samples were submitted for percent oil-and-grease testing. No evidence of the tank having leaked was observed. The tank did not have any observable holes in it, nor was there any oil staining or odor in the soil beneath the tank. However, a two-inch metal pipe was found paralleling the top of the tank, running in a northeast-southwest direction. It bent southeastward at the southern end of the excavation and disappeared into the earth at depth 3 feet. Soil surrounding the pipe was discolored and black. However, there was no odor. One sample was taken of the discolored soil at the southwestern corner of the excavation. It was named the "Tank 3" sample because it was the third soil sample collected from the tank excavation. The excavation was backfilled with the soil excavated from it and with crushed rock.

RESULTS OF FIELD INVESTIGATION

SAND-FILL GRAB SAMPLES; EP TOXICITY TESTING

The results of the EP Toxicity testing of the grab samples of the sand fill are in Appendix 6 (report dated November 13, 1987). None of the test parameters exceeded maximum allowed levels.

SUSPECTED UNDERGROUND STORAGE TANK PIPES

Water from three of the suspected fill/distribution pipes was tested for pH and specific conductance. The test results are in Appendix 6 (report dated December 30, 1987). Conductance ranged from 68 to 88 micromhos/cm; pH ranged from 5.5 to 5.9. These values suggested that the water in the pipes was not polluted. These results and the fact that the pipes did not go into tanks made it unlikely the pipes were in any way related to underground storage tanks. Proof of this was provided by a former employee of the sawmill, who said that the pipes were distribution lines for fire-protection systems at the former sawmill and planing mill.

GROUND WATER SAMPLES

Ground water from borings T-1 and T-2 was tested for nitrate-nitrogen, total organic carbon (TOC) and TOX. The results are in Appendix 6 (report dated January 11, 1988). The sample from T-1 does not show any obvious impacts on water quality due to the drainfield.

Two vertically overlapping water samples were taken immediately below the water table at T-2. The results for both samples are essentially identical, an expected result given the samples' vertical proximity. Both samples have larger TOC and TOX concentrations than at boring T-1, but neither sample shows any clear indication that shallow ground water has been affected by oil from the overlying sand fill, the bottom of which is 26 feet above the water table at the location of boring T-2.

TEST PIT 7 SOIL SAMPLES

S-1 400 mg/kg
S-2 500 mg/kg

Samples S-1 and S-2 were both tested for 1) weight-percent oil and grease, 2) TOX and 3) volatile organics (by EPA methods 8010 and 8020). Sample S-1 was also tested for PCBs. The results are in Appendix 6 (report dated January 19, 1988). Only sample S-1, of dry sand at depth 3 feet, shows any test constituent concentrations of note. The sample has a TOX concentration of 294 ppm and a total xylenes concentration of 310 ppb. The TOX concentration is not explained by the xylenes because xylenes do not contain halogens. This unexplained TOX value prompted an additional test on S-1 for PCBs. PCBs were measured as being <0.2 ppm. The TOX value remains unexplained.

UNDERGROUND STORAGE TANK AT TEST PIT 2

The results of tests on the contents of the tank were discussed in a preceding section. The contents did not fail the hazardous waste tests that were conducted and appeared to be diesel oil.

The two soil samples taken from a depth one foot below the bottom of the former tank and from discolored soil near the 2-inch pipe were tested for weight-percent oil and grease. The results are in Appendix 6.

The samples from beneath the tank, Tank 1 and Tank 2, had 0.01 (100 mg/kg) and 0.02 percent oil and grease. Tank 3, the soil sample from near the 2-inch pipe, had 0.02 (200 mg/kg) percent oil and grease. These low percentages indicate that there is no contamination problem due to potential past leaks from the tank.

CONCLUSIONS

1. The sand fill did not fail the EP Toxicity test.

2. A single sample of dry sand from TP-7 shows evidence of 1) contamination with xylenes and 2) potential contamination with halogenated compounds, as indicated by a TOX value of 294 ppm. The value is not explained by PCBs because a test on the sample did not detect PCBs.

3. Samples S-1 and S-2 from TP-7 are characterized by low weight percentages of oil and grease, and are not saturated. However, enough oil is present to create localized zones of oily water. The water is rain and/or runon that has infiltrated the sand fill and become perched atop a clayey silt layer at depth 6 feet.

4. To fully determine the extent of any potential contamination problem with the sand fill requires that 1) additional exploration be done to determine the sand's areal extent and thickness and/or the presence of any other localized zones of oily water and 2) the sand be characterized chemically by determining the extent of oil and grease and the other compound(s) responsible for the TOX value observed in sample S-1 in TP-7.

5. Shallow ground water beneath the drainfield and sand-fill area shows no obvious impacts due to the drainfield and oil in the overlying sand fill, respectively. The water quality results from the sand-fill area are supported by the lack of evidence of oil staining in unsaturated soil beneath the sand fill and above the water table.

6. A geophysical survey located one underground storage tank. Its contents were not identified as hazardous waste, but instead appeared to be diesel. The tank was removed and its contents disposed of by C&O.

7. No impacts on soil and/or ground water quality due to offsite activities were investigated by field sampling and laboratory testing as part of this study.

LIMITATIONS

The analysis, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of these investigations. All work was carried out by or under the direction of a professional geologist. All work was completed to the normal standards of the profession and in accordance with generally accepted geological principles and practices. If, during additional investigation, data or conditions at the site differing materially from those indicated in this report are known or become available, Sweet-Edwards/EMCON should be contacted promptly to facilitate a review and investigation of those conditions in order to determine if any modifications of findings, conclusions and/or recommendations are warranted.

REFERENCE

Trimble, D.E., 1963, Geology of Portland, Oregon and adjacent areas: U.S. Geological Survey Bulletin 1119.

TABLE 1

INFORMATION SOURCES

Environmental Problems

Oregon Department of Environmental Quality--Underground Storage Tank Program and Northwest Region Office.

Geology/Hydrogeology

Trimble (1963)--General Site Area Geology

Oregon Water Resources Division--Water Well Records (on file at U.S. Geological Survey, Portland)

Land Use

City of Portland--Sewer Locations

Ted Haskill, Union Pacific Railroad (UPRR)--UPRR diesel pipeline near site

Former Employee of former onsite sawmill

Dave Aldrich, Transamerica Title--Title records

U.S. Army Corps of Engineers, Cartography and Remote Sensing Section--Historical aerial photographs

LAMP2-R.404bg

TABLE 2
U.S. ARMY CORPS OF ENGINEERS
AERIAL PHOTOGRAPHS REVIEWED
FOR HISTORICAL LAND USES

YEAR	PHOTOGRAPH	SCALE
1936	38-5863	1:15,000
1939	4673	1:10,200
1940	40-5889	1:10,600
1948	589VV162PL, R391, 353 R6	Unknown
1957	57-3303	1:8,500
1961	61-1172	1:8,300
1963	63-2810	1:12,000
1967	67-955	1:12,000
1970	70-1058	1:25,000
1971	71-3292	1:3,000
1972	72-2795	1:6,000
1973	73-2192	1:24,000
1976	76-173	1:48,000
1977	77-485	1:24,000
1979	79-1636*	1:30,000
1980	80-285	1:12,000
1981	81-1536*	1:48,000
1983	83-1000*	1:24,000
1986	86-289	1:48,000

* Color infrared photograph. All others black and white.

LAMP2-T2.226

TABLE 3
LIST OF PAST ONSITE PROPERTY OWNERSHIP
BY BUSINESSES

Block 1

Oregon Barrel Co., Marine Iron Works, Star Sand Co., American Marine Iron Works, Western Wool Warehouse, Portland Manufacturing Co., Portland Wood Products, Portland Woolen Mills, Lawrence Warehouse Co.

Block 2

Oregon Barrel Co., Central Lumber Co., Marine Iron Works, St. Johns Lumber Co., Marine Iron Works, American Marine Iron Works, Western Wool Warehouse, Beaver-Linnton Mills, L.B. Menefee Lumber Co., Lawrence Warehouse Co., Portland Woolen Mills, Portland Spruce Mills

Block 3

Central Lumber Co., St. Johns Lumber Co., Beaver-Linnton Mills, L.B. Menefee Lumber Co., Portland Spruce Mills, Skookum (logging equipment), Portland Lumber Co., Portland Manufacturing Co., Simpson Lumber Co.

Block 4

St. Johns Lumber Co., Beaver-Linnton Mills, Portland Lumber Mills, Portland Manufacturing Co., Portland Spruce Mills

Block 7

Portland General Electric, Portland Railway, Light and Power Co., Penninsula Iron Works, Portland Lumber Mills, Brand S Corp.

Block 8

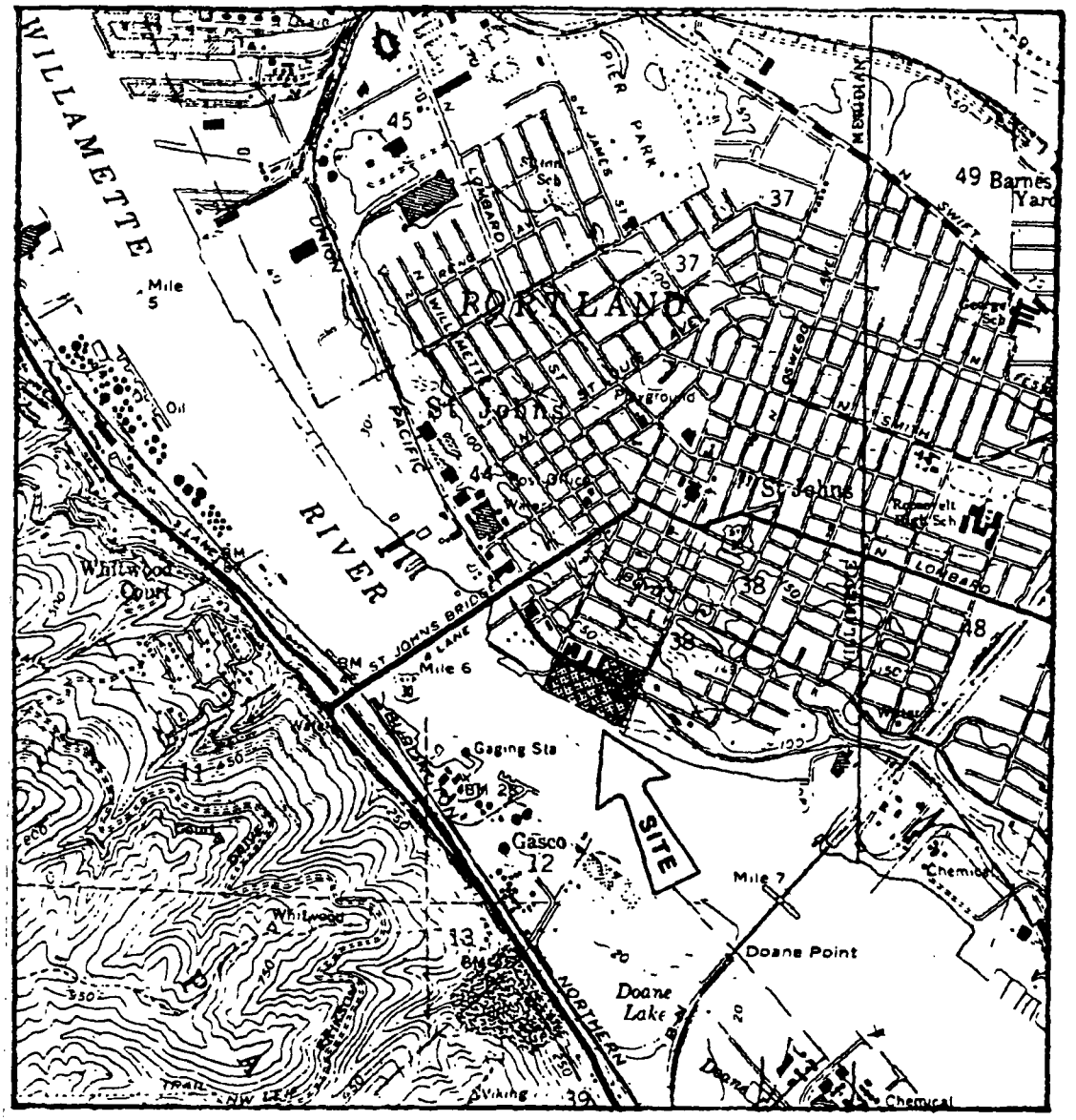
Portland Steel Shipbuilding, Portland Stove and Range Manufacturing Co., Portland Lumber Mills

River Lots

Oregon Barrel Co., Central Lumber Co., Marine Iron Works, American Marine Iron Works, St. Johns Lumber Co., Western Wool Warehouse, Beaver-Linnton Mills, L.B. Menefee Lumber Co., Portland Manufacturing Co., Portland Spruce Mills, Portland Wood Products Co.

TABLE 4
TEST PIT DESCRIPTIONS

TEST PIT	DEPTH (ft.)	DESCRIPTION
6	0-4	Black sand fill.
	4	Final depth; top of concrete slab.
7	0-3	Black sand fill.
	3-6	Mixed black sand fill, silt, and timber.
	6->6.5	Gray clayey silt.
8	0-1	Black sand fill.
	1	Final depth; top of concrete slab.
9	0-5	Black sand fill.
	5-8	Brown clayey, sandy silt.
10	0-10	Brown silt, sand, metal debris, and bricks.
11	0-1	Black sand fill.
	1-2	Mixed clayey silt, sand, cobbles, and bricks.



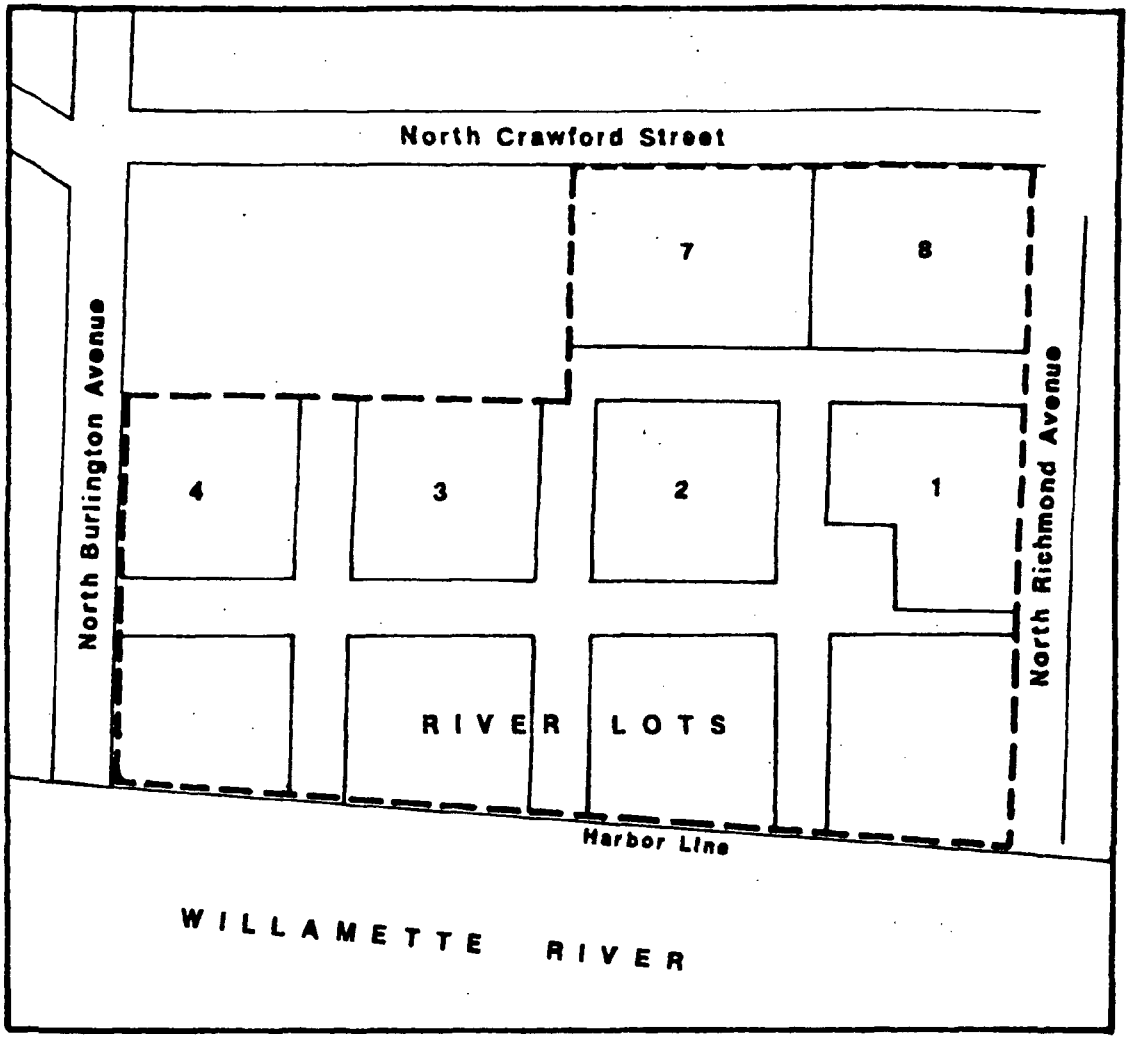
Base map U.S. Geological Survey Linton/Portland, Oregon 7.5-minute quad

N

0 2000 4000

Scale in Feet

MMI (Lampros Steel Site)	
Location Map	
Sweet-Edwards / EMCON, Inc.	
	INITIALS / DATE
DRAWN BY	JK 2/1/88
CHECKED BY	
REVISED	Figure 1



EXPLANATION

— — — Site Boundary

N

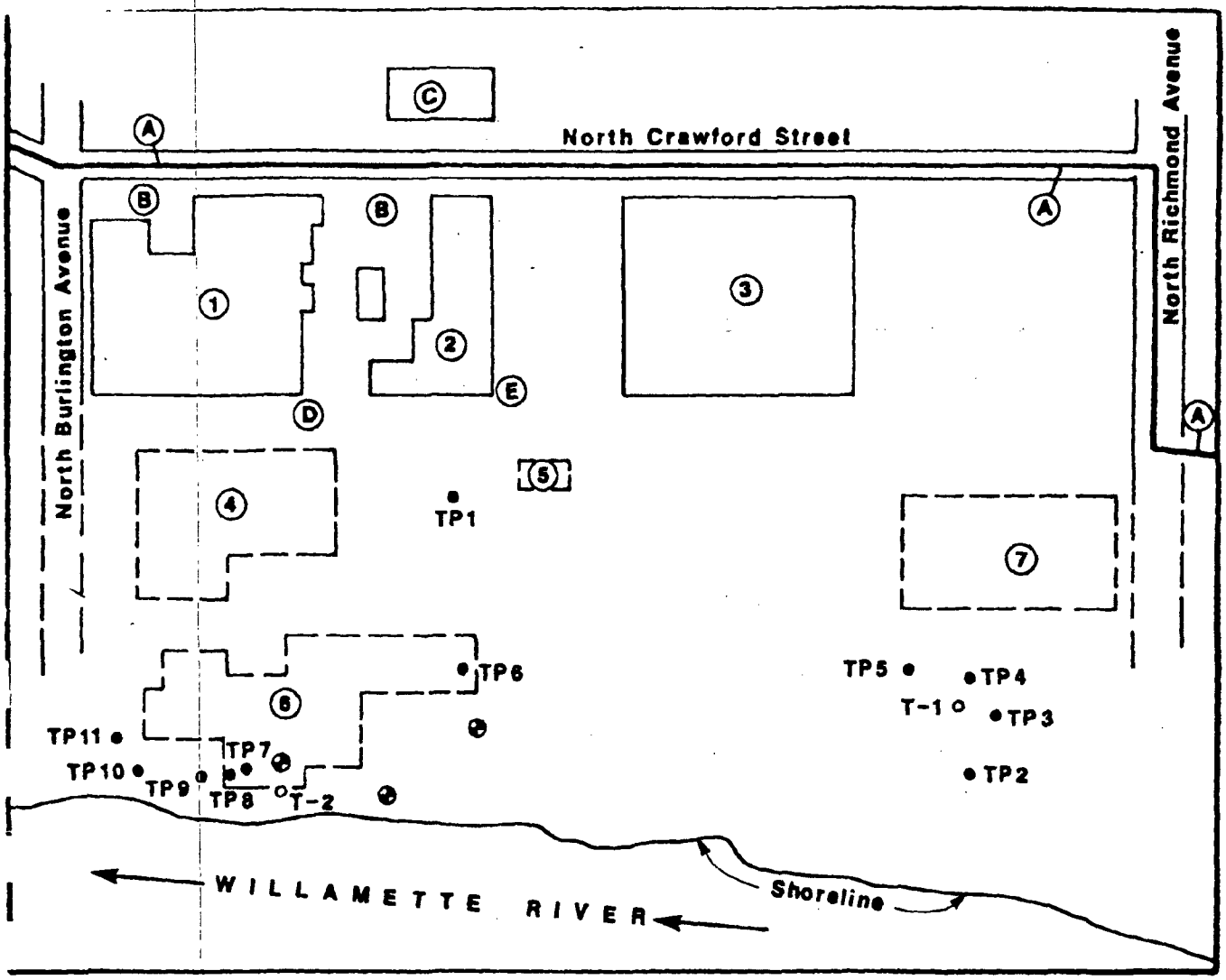
MMI (Lampros Steel Site)

Block and Lot Locations

Sweet-Edwards / EMCON, Inc.

	INITIALS	DATE
DRAWN BY	jf	2/2/88
CHECKED BY		
REVISED		

Figure 2



EXPLANATION

POTENTIAL OFFSITE CONTAMINANT SOURCES

- (A) 8-inch Union Pacific Railroad diesel pipeline
- (B) Former underground storage tanks
- (C) Underground storage tank and steamcleaning area, St. Johns Truck Service
- (D) Oily soil and surface water runoff
- (E) Compressor-blowdown oil, Columbia Forge

CURRENT AND FORMER (F) BUISNESS BUILDING

- (1) Skookum (F), Asset Recovery, Columbia Forge
- (2) Columbia Forge
- (3) Dry Shed (F), warehouse
- (4) Planing Mill (F)
- (5) Chip Bin (F)
- (6) Sawmill (F)
- (7) Wool Scouring (F), plywood storage (F), "Fibron Insulation" (F)

SAMPLE SITES

- Surface grab sample of sand fill. Samples composited for EP Toxicity Testing.
- Test Pit
- Test Boring

N

0 125 250

Scale in Feet

= 164 ft

MMI (Lampros Steel Site)

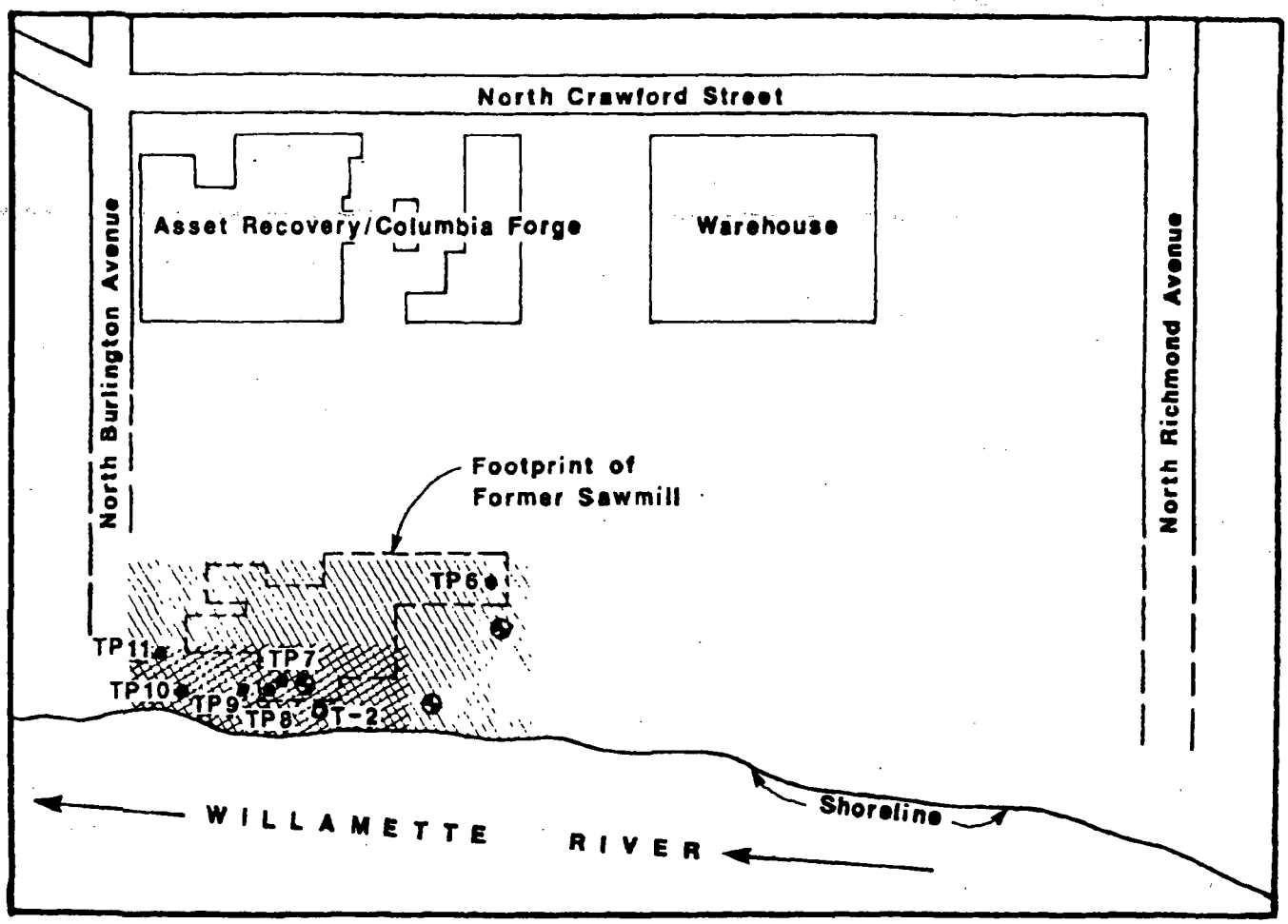
Site Map

Sweet-Edwards / EMCON, Inc.

	INITIALS	DATE
DRAWN BY	jf	2/2/88
CHECKED BY		
REVISED		

Figure 3

CRAW00004729



Base From: Corps of Engineers aerial photograph 77-485 (9 May 1977)

EXPLANATION

- ● Test Pit
- ○ Reconnaissance Test Boring
- ⊕ Surface grab sample of sand fill. Samples composited into single sample for EP Toxicity Testing.
- Approximate Maximum Area of Sand Fill
- Approximate Area of Thickest (>2-3 ft) of Sand Fill

N

0 125 250

Scale in Feet

≈ 171 ft.

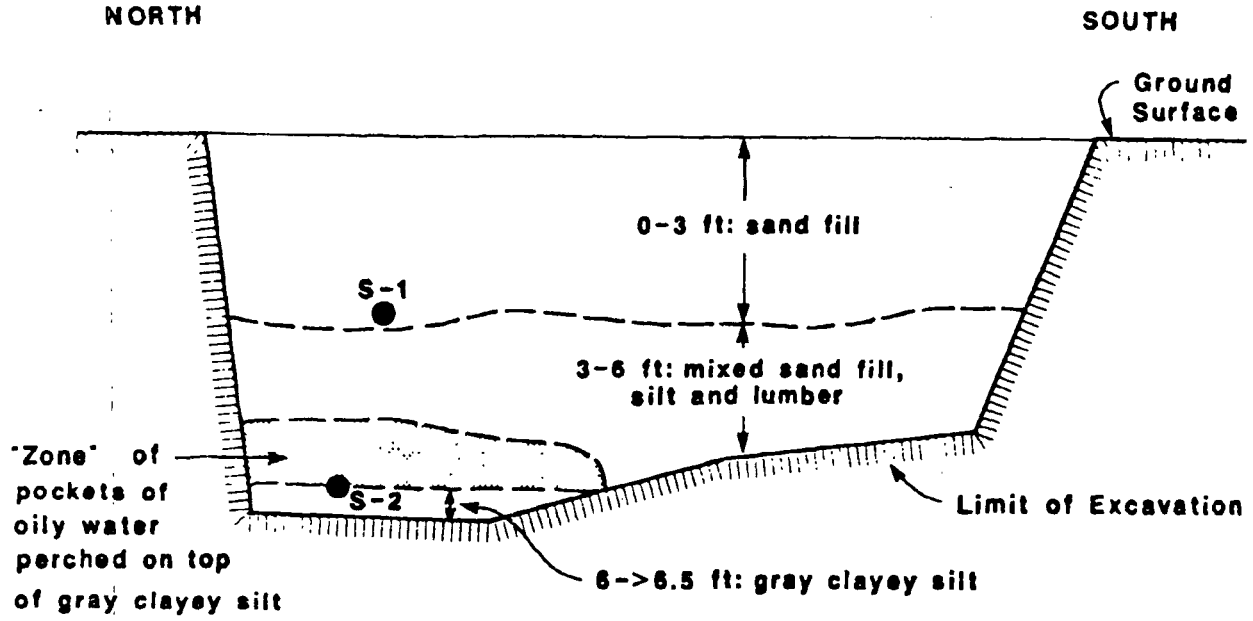
MMI (Lampros Steel Site)

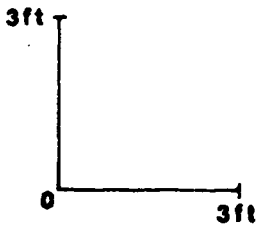
Test Pit, Reconnaissance Test Boring, Sand-Fill Area Locations

Sweet-Edwards / EMCON, Inc.

	INITIALS	DATE
DRAWN BY	jf	2/2/88
CHECKED BY		
REVISED		

Figure 4





Scale

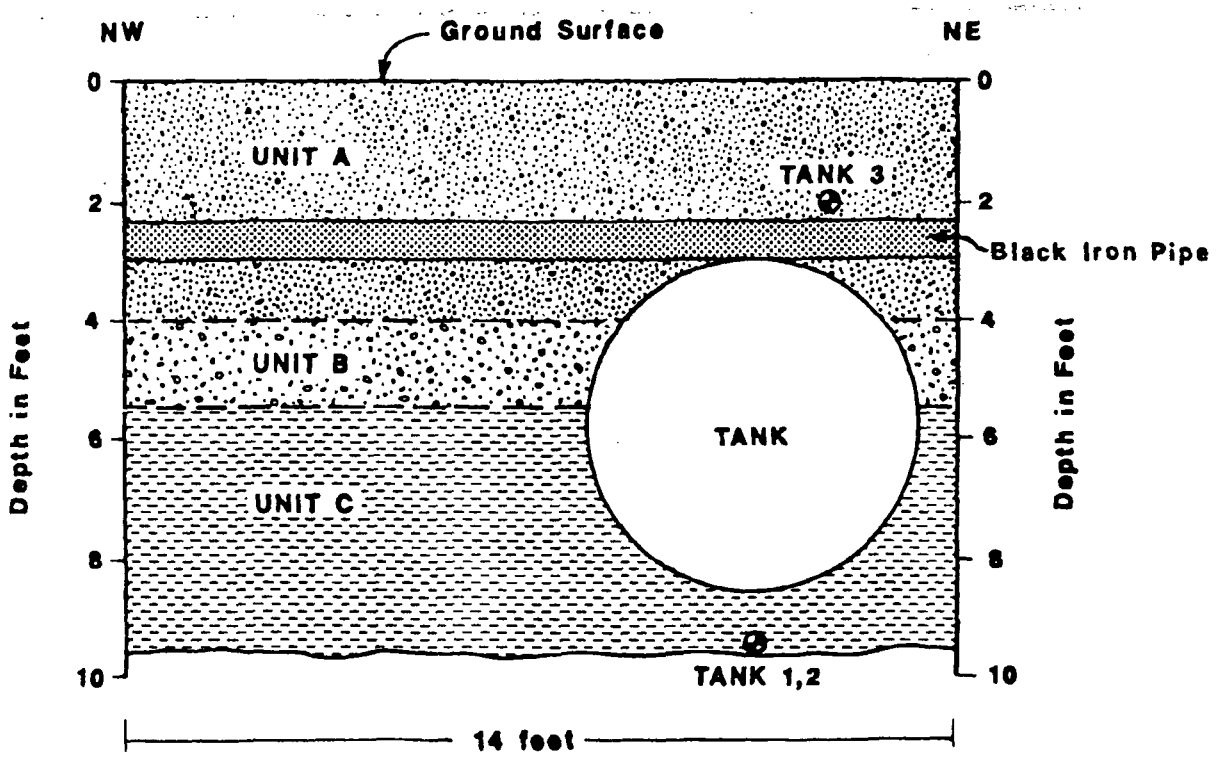
MMI (Lampros Steel Site)

Cross Section, Test Pit 7, Sand-Fill Area

Sweet-Edwards / EMCON, Inc.

	INITIALS	DATE
DRAWN BY	jf	2/2/88
CHECKED BY		
REVISED		

Figure 5



EXPLANATION

◕ Sample Location

UNIT A 0-4.0' GRAVELLY SAND, 30% rounded GRAVELS, 80% coarse to medium SAND, brown to dark brown, organics, dry to moist.

UNIT B 4.0-5.5' GRAVELLY SAND, 20% pebble size GRAVEL, 80% coarse to medium SAND, brown to dark brown, damp.

UNIT C 5.5-9.6' CLAYEY SILT, slightly plastic, 60-70% SILT, 30-40% CLAY, light brown, dense, moist.

TANK not to scale

0 3 6

Scale in Feet

No Vertical Exaggeration

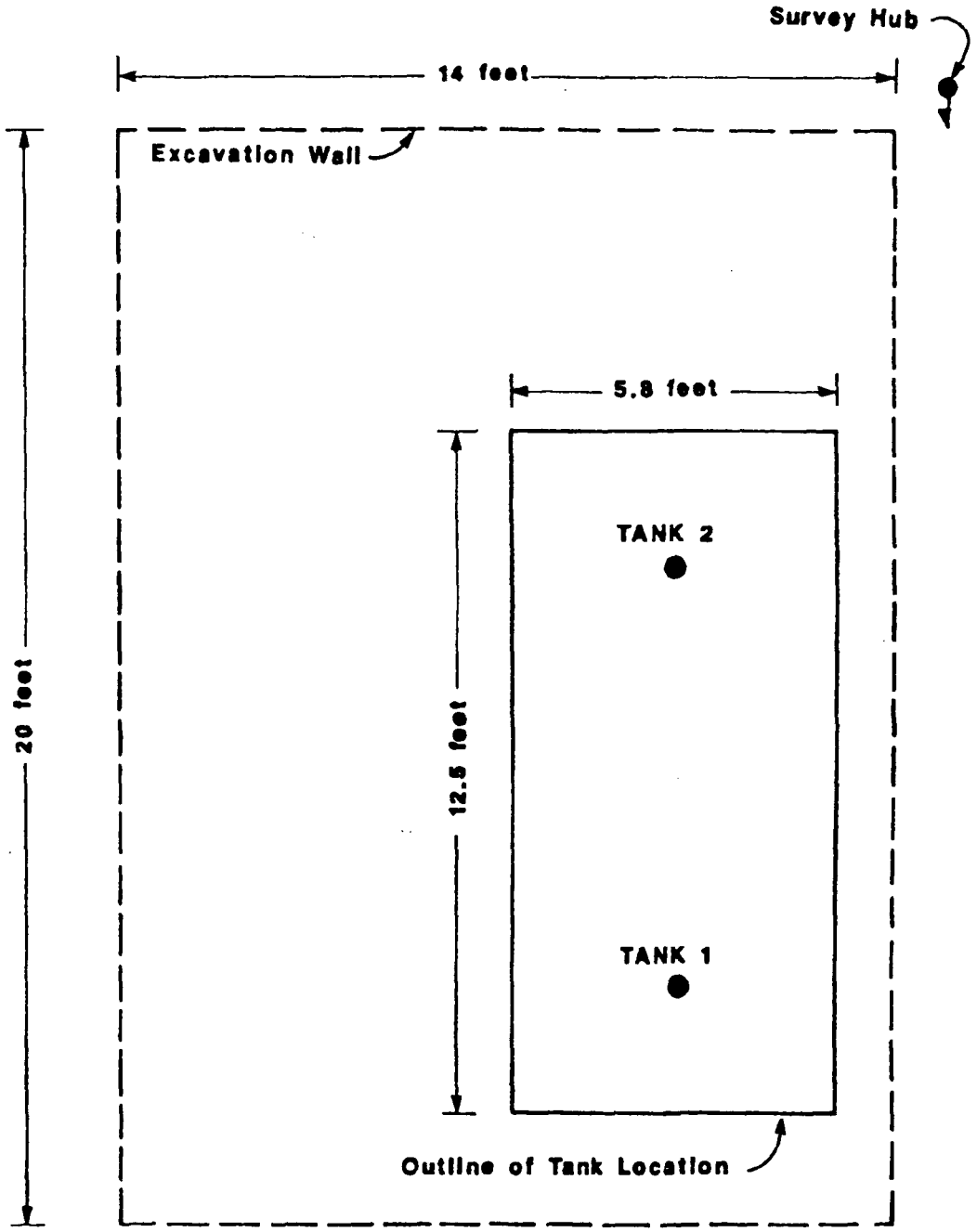
MMI (Lamprox Steel Site)

Tank Excavation Cross Section

Sweet-Edwards / EMCON, Inc.

	INITIALS	DATE
DRAWN BY	JF	2/1/88
CHECKED BY	DO	
REVISED		

Figure 6



EXPLANATION

● Soil Sample Location Below Tank

N

0 4 8

Scale in Feet

MMI (Lampros Steel Site)

Plan View Tank Excavation

Sweet-Edwards / EMCON, Inc.

	INITIALS	DATE
DRAWN BY	jf	1/25/88
CHECKED BY	DB	
REVISED		

Figure 7

APPENDIX 1

Notification Forms and Laboratory Test Results
Asset Recovery/Columbia Forge Underground Storage Tanks

Notification for Underground Storage Tanks

To: Oregon Department of Environmental Quality
Underground Storage Tank Program
P.O. Box 1760
Portland, Oregon 97207

STATE USE ONLY
I.D. Number
Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been in use to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means—

(1) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances, and

(2) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: 1. gasoline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:

1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. This form must be completed for each location containing underground storage tanks. If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached: 0

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)
COLUMBIA FORGE + MACH. WORKS

Street Address
8424 N. CRAWFORD

County
MULTNOMAH

City: PORTLAND State: OR. Zip Code: 97203

Area Code Phone Number
(503) 286-3621

Type of Owner (Mark all that apply ☒)

- ☐ Current
- ☐ Former
- ☐ State or Local Gov't.
- ☐ Federal Gov't. (GSA facility I.D. no.) _____
- ☒ Private or Corporate
- ☐ Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section I, mark box here ☒)

Facility Name or Company Site Identifier, as applicable

Street Address or State Road, as applicable

County

City (nearest) State Zip Code

Indicate number of tanks at this location: 2

Mark box here if tank(s) are located on land within an Indian reservation or other Indian trust lands ☐

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here ☐)
HENRY STROMQUIST

Job Title
GENERAL MANAGER

Area Code (503) Phone Number 286-3621

IV. TYPE OF NOTIFICATION

☐ Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative
HENRY STROMQUIST — GEN MGR

Signature
Henry Stromquist

Date Signed
1/19/87

CONTINUE ON REVERSE SIDE

Form 7530-1(11-85)

Please complete the voluntary UST Survey on Page 4.

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS (Complete for each tank at this location.)

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential No. (e.g., 1, 2, 3...)	Tank No. 1	Tank No. 2	Tank No.	Tank No.	Tank No.
1. Status of Tank (Mark all that apply ☒)					
Currently in Use	☐	☐	☐	☐	☐
Temporarily Out of Use	☐	☐	☐	☐	☐
Permanently Out of Use	☒	☒	☐	☐	☐
Brought into Use after 5/8/86	☐	☐	☐	☐	☐
2. Estimated Age (Years)	19	35			
3. Estimated Total Capacity (Gallons)	1000	1000			
4. Material of Construction (Mark one ☒)					
Steel	☒	☒	☐	☐	☐
Concrete	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
5. Internal Protection (Mark all that apply ☒)					
Cathodic Protection	☐	☐	☐	☐	☐
Interior Lining (e.g., epoxy resins)	☐	☐	☐	☐	☐
None	☒	☒	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
6. External Protection (Mark all that apply ☒)					
Cathodic Protection	☐	☐	☐	☐	☐
Painted (e.g., asphaltic)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic Coated	☐	☐	☐	☐	☐
None	☒	☒	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
7. Piping (Mark all that apply ☒)					
Bare Steel	☒	☒	☐	☐	☐
Galvanized Steel	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Cathodically Protected	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
8. Substance Currently or Last Stored in Greatest Quantity by Volume (Mark all that apply ☒)					
a. Empty	☐	☒	☐	☐	☐
b. Petroleum					
Diesel	☐	☐	☐	☐	☐
Kerosene	☐	☐	☐	☐	☐
Gasoline (including alcohol blends)	☐	☒	☐	☐	☐
Used Oil	☒	☐	☐	☐	☐
Other, Please Specify	BUNKER OIL				
c. Hazardous Substance	☐	☐	☐	☐	☐
Please Indicate Name of Principal CERCLA Substance					
or Chemical Abstract Service (CAS) No.					
Mark box ☒ if tank stores a mixture of substances	☐	☐	☐	☐	☐
d. Unknown	☐	☐	☐	☐	☐
Additional Information (for tanks permanently taken out of service)					
a. Estimated date last used (mo/yr)	1985	1960	/	/	/
Estimate quantity of substance remaining (gal.)	100	EMPTY			
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)	☐	☒	☐	☐	☐

THANK YOU FOR YOUR ASSISTANCE

Name (from Section I EPA Form) COLUMBIA FORGE Location (from Section II EPA form) PORTLAND OR. Page 3 of 3 Pages

OREGON UNDERGROUND STORAGE TANK (UST) SURVEY

The underground storage tank program will soon include performance standards for new tanks and regulations for leak detection/ prevention and corrective actions which will affect owners and operators of underground storage tanks. In preparation for these new requirements, the Department has prepared a state-wide survey. The Department requests that owners of underground storage tanks complete the survey questions.

Your response to these questions will assist the Department in developing a cost-effective and responsive state-wide regulatory program. In addition, owners of underground storage tanks may find the survey useful in the management of such tanks.

INSTRUCTIONS

Please type or print in ink all items. Please complete one survey form for each location containing underground storage tanks. Tank I.D. should correspond to Tank I.D. on EPA form 7530-1 for the respective facility location. If more than five tanks are owned at this location, photocopy this survey or request additional forms from DEQ, and staple continuation sheets to this survey.

Tank Identification No.	Tank No. 1	Tank No. 2	Tank No.	Tank No.	Tank No.
1. Status of Tank (Check One)					
If temporarily out of use, Estimated time out of use:					
1 month - 6 months	☐	☐	☐	☐	☐
6 months - 1 year	☐	☐	☐	☐	☐
1 year - 5 years	☐	☐	☐	☐	☐
5 years or more	☒	☒	☐	☐	☐
Estimated date to be brought back into use (mo/yr)	/	/	/	/	/
2. Was tank new at time of installation? (Y/N)	UNKNOWN	UNKNOWN			
3. Containment Systems (check one)					
Single-walled tank	☒	☒	☐	☐	☐
Double-walled tank	☐	☐	☐	☐	☐
Pit-lining system	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
4. Leak Detection System (check all that apply)					
Visual	☐	☐	☐	☐	☐
Stock inventory	☐	☐	☐	☐	☐
Tile drain	☐	☐	☐	☐	☐
Vapor wells	☐	☐	☐	☐	☐
Sensor instrument (specify type):					
In-ground detector	☐	☐	☐	☐	☐
Within walls of double-walled tank	☐	☐	☐	☐	☐
Ground water monitoring wells	☐	☐	☐	☐	☐
Continuous in piping	☐	☐	☐	☐	☐
Pressure test	☐	☐	☐	☐	☐
Internal inspection	☐	☐	☐	☐	☐
Other, specify					
None	☒	☒	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
5. Overfill Protection (Yes/No)	NO	NO			
6. Location of Piping (check all that apply)					
No parts in contact with soil	☐	☐	☐	☐	☐
Parts contacting the soil which are:					
Unprotected metal	☒	☒	☐	☐	☐
Made of corrosion resistant materials	☐	☐	☐	☐	☐
Corrosion-resisted coated	☐	☐	☐	☐	☐
Cathodically protected	☐	☐	☐	☐	☐
Double-walled	☐	☐	☐	☐	☐
Within a secondary containment	☐	☐	☐	☐	☐
Interior lined	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
7. History of Tank Repairs (check one except as indicated)					
If tank repaired, indicate date of last repairs (mo/yr)	/	/	/	/	/
None	☒	☒	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
8. History of Pipe Repairs (check one except as indicated)					
If pipe repaired, indicate date (mo/yr)	/	/	/	/	/
None	☒	☒	☐	☐	☐
Unknown	☐	☐	☐	☐	☐

THANK YOU FOR YOUR ASSISTANCE

Notification for Underground Storage Tanks

APPROVAL EXPIRES 6-30-88

To: Oregon Department of Environmental Quality
Underground Storage Tank Program
P.O. Box 1760
Portland, Oregon 97207

STATE USE ONLY
I.D. Number
Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been in to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information ...rested is required by Section 9002 of the Resource Conservation and Recovery ct, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate withdrawn tanks that store or have stored petroleum or hazardous substances. It is cted that the information you provide will be based on reasonably available cords, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless xpted, owners of underground tanks that store regulated substances must notify nated State or local agencies of the existence of their tanks. Owner means—

In the case of an underground storage tank in use on November 8, 1984, or rought into use after that date, any person who owns an underground storage tank sed for the storage, use, or dispensing of regulated substances, and

In the case of any underground storage tank in use before November 8, 1984, no longer in use on that date, any person who owned such tank immediately re the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated ...tances," and (2) whose volume (including connected underground piping) is or more beneath the ground. Some examples are underground tanks storing ...soline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or migants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to ification. Other tanks excluded from notification are:

farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;

2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. This form must be completed for each location containing underground storage tanks. If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached: 0

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)
CRAWFORD STREET CORP.

Street Address
4927 NW FRONT AVE

County
MULTNOMAH

City / State / Zip Code
PORTLAND OR 97210

Area Code / Phone Number
(503) 227-4313

Type of Owner (Mark all that apply ☒)

Current / Former
☐ State or Local Gov't.
☐ Federal Gov't. (GSA facility I.D. no.) _____
☒ Private or Corporate
☐ Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section I, mark box here ☐)

Facility Name or Company Site Identifier, as applicable
CRANFORD STREET CORP.

Street Address or State Road, as applicable
8524 N. CRANFORD

County
MULTNOMAH

City (nearest) / State / Zip Code
PORTLAND OR 97203

Indicate number of tanks at this location: 1

Mark box here if tank(s) are located on land within an Indian reservation or other Indian trust lands ☐

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here ☐) / Job Title / Area Code / Phone Number
HENRY STROMQUIST / GENERAL MANAGER / (503) 286-3621

IV. TYPE OF NOTIFICATION

☐ Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative
HENRY STROMQUIST - GEN. MGR.

Signature

Date Signed
1/19/87

CONTINUE ON REVERSE SIDE

EPA Form 7530-1 (11-85)

Please complete the voluntary UST Survey on Page 4.

Name (from Section I) CRAWFORD STREET CORP Location (from Section II) PORTLAND OR Page No. 2 of 3 Pages

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS (Complete for each tank at this location.)

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential No. (e.g., 1, 2, 3...)	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
1. Status of Tank (Mark all that apply ☒)					
Currently in Use	☐	☐	☐	☐	☐
Temporarily Out of Use	☐	☐	☐	☐	☐
Permanently Out of Use	☒	☐	☐	☐	☐
Brought into Use after 5/8/86	☐	☐	☐	☐	☐
2. Estimated Age (Years)	50				
3. Estimated Total Capacity (Gallons)	5000				
4. Material of Construction (Mark one ☒)					
Steel	☒	☐	☐	☐	☐
Concrete	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
5. Internal Protection (Mark all that apply ☒)					
Cathodic Protection	☐	☐	☐	☐	☐
Interior Lining (e.g., epoxy resins)	☐	☐	☐	☐	☐
None	☒	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
6. External Protection (Mark all that apply ☒)					
Cathodic Protection	☐	☐	☐	☐	☐
Painted (e.g., asphaltic)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic Coated	☐	☐	☐	☐	☐
None	☒	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
7. Piping (Mark all that apply ☒)					
Bare Steel	☒	☐	☐	☐	☐
Galvanized Steel	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Cathodically Protected	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
8. Substance Currently or Last Stored in Greatest Quantity by Volume (Mark all that apply ☒)					
a. Empty	☒	☐	☐	☐	☐
b. Petroleum					
Diesel	☒	☐	☐	☐	☐
Kerosene	☐	☐	☐	☐	☐
Gasoline (including alcohol blends)	☐	☐	☐	☐	☐
Used Oil	☐	☐	☐	☐	☐
Other, Please Specify					
c. Hazardous Substance	☐	☐	☐	☐	☐
Please Indicate Name of Principal CERCLA Substance					
or Chemical Abstract Service (CAS) No.					
Mark box ☒ if tank stores a mixture of substances	☐	☐	☐	☐	☐
d. Unknown	☐	☐	☐	☐	☐
Additional Information (for tanks permanently taken out of service)					
a. Estimated date last used (mo/yr)	6/1985				
b. Estimate quantity of substance remaining (gal.)	EMPTY				
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)	☐	☐	☐	☐	☐

EPA Form 7530-1 (11-85) Reverse

THANK YOU FOR YOUR ASSISTANCE

Owner Name (from Section I EPA Form) CRAWFORD STREET CORP. Location (from Section II EPA form) PORTLAND OR Page 3 of 3 Pages

OREGON UNDERGROUND STORAGE TANK (UST) SURVEY

The underground storage tank program will soon include performance standards for new tanks and regulations for leak detection/prevention and corrective actions which will affect owners and operators of underground storage tanks. In preparation for these new requirements, the Department has prepared a state-wide survey. The Department requests that owners of underground storage tanks complete the survey questions.

Your response to these questions will assist the Department in developing a cost-effective and responsive state-wide regulatory program. In addition, owners of underground storage tanks may find the survey useful in the management of such tanks.

INSTRUCTIONS

Please type or print in ink all items. Please complete one survey form for each location containing underground storage tanks. Tank I.D. should correspond to Tank I.D. on EPA form 7530-1 for the respective facility location. If more than five tanks are owned at this location, photocopy this survey or request additional forms from DEQ, and staple continuation sheets to this survey.

Tank Identification No.	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
1. Status of Tank (Check One) — If temporarily out of use, Estimated time out of use:					
1 month - 6 months	☐	☐	☐	☐	☐
6 months - 1 year	☐	☐	☐	☐	☐
1 year - 5 years	☐	☐	☐	☐	☐
5 years or more	☒	☐	☐	☐	☐
Estimated date to be brought back into use (mo/yr)	— / —	/	/	/	/
2. Was tank new at time of installation? (Y/N)					
3. Containment Systems (check one) — Single-walled tank	☒	☐	☐	☐	☐
Double-walled tank	☐	☐	☐	☐	☐
Pit-lining system	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
4. Leak Detection System (check all that apply) — Visual	☐	☐	☐	☐	☐
Stock inventory	☐	☐	☐	☐	☐
Tile drain	☐	☐	☐	☐	☐
Vapor wells	☐	☐	☐	☐	☐
Sensor instrument (specify type):					
In-ground detector	☐	☐	☐	☐	☐
Within walls of double-walled tank	☐	☐	☐	☐	☐
Ground water monitoring wells	☐	☐	☐	☐	☐
Continuous in piping	☐	☐	☐	☐	☐
Pressure test	☐	☐	☐	☐	☐
Internal inspection	☐	☐	☐	☐	☐
Other, specify					
None	☒	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
5. Overfill Protection (Yes/No)	UNKNOWN				
6. Location of Piping (check all that apply) — No parts in contact with soil	☐	☐	☐	☐	☐
Parts contacting the soil which are:					
Unprotected metal	☒	☐	☐	☐	☐
Made of corrosion resistant materials	☐	☐	☐	☐	☐
Corrosion-resisted coated	☐	☐	☐	☐	☐
Cathodically protected	☐	☐	☐	☐	☐
Double-walled	☐	☐	☐	☐	☐
Within a secondary containment	☐	☐	☐	☐	☐
Interior lined	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
7. History of Tank Repairs (check one except as indicated) — If tank repaired, indicate date of last repairs (mo/yr)	/	/	/	/	/
None	☐	☐	☐	☐	☐
Unknown	☒	☐	☐	☐	☐
8. History of Pipe Repairs (check one except as indicated) — If pipe repaired, indicate date (mo/yr)	/	/	/	/	/
None	☐	☐	☐	☐	☐
Unknown	☒	☐	☐	☐	☐

THANK YOU FOR YOUR ASSISTANCE

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 13, 1987
Log #A870305-I
PO#: 2789

Columbia Forge & Machine
8434 N. Crawform St.
Portland, Oregon 97203

ATTENTION: John Shore

SUBJECT: EP TOXICITY ANALYSIS

SOIL BENEATH DIESEL TANK, COLUMBIA FORGE

METHOD: Federal Register, Vol. 45 No. 98, Monday, May 19, 1980, Rules and Regulations, Appendix II, Page 33127.

FIELD DATA: Sample ID: 8000 gal Tank, 3/5/87
Collected by: Sample collected and delivered by client.

Sample Received: March 5, 1987

ANALYSIS	RESULTS	LIMIT
Arsenic	< 0.100	5.0
Barium	0.028	100
Cadmium	0.015	1.0
Chromium	< 0.010	5.0
Lead	< 0.100	5.0
Mercury	< 0.100	0.2
Selenium	< 0.100	1.0
Silver	< 0.010	5.0

< denotes "less than" the detection limit for the method.
Results are reported in milligrams per liter (mg/L)

REPORT CONTINUES

Weld slag - liquid initial test (no reach)

This report is for the sole and exclusive use of the above client.
Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 13, 1987
Log #A8700305-I
PO#: 2789

Columbia Forge & Supply
Page Two
Attention: John Shore

Analysis Requested: Solvent Scan

Sample ID: 8000 gal. Tank

-CONTENTS-
DIESEL TANK, COLUMBIA FORGE

Sample Received: March 5, 1987

ANALYSIS	RESULTS
Acetone	< 500
1,1,2,2-Tetrachloroethane	< 100
-Dichlorobenzene	< 100
n-Butyl acetate	< 100
O-Dichlorobenzene	< 100
Chlorobenzene	< 100
Diethyl ether	< 500
Ethanol	< 500
Ethyl acetate	< 500
Ethyl benzene	< 100
Freon 113	< 100
Isopropyl alcohol	< 500
Methanol	< 500
Methyl ethyl ketone	< 300
Methyl isobutyl ketone	< 100
Methylene chloride	< 100
Tetrachloroethylene	< 100
Toluene	< 100
Trichloroethylene	< 100
1,1,1-Trichloroethane	< 100
Xylenes	< 100

Results in mg/L

Analysis by carbon disulfide extraction, GC/FID and methanol extraction GC/MSD.

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

REPORT CONTINUES

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 13, 1987
Log #A870305-I
PO#: 2789

Columbia Forge & Machine
Page Three

CONTENTS, DIESEL TANK, COLUMBIA FORGE

Attention: John Shore

Sample ID: 8000 gal. Tank

Sample Date: March 5, 1987

Sample Received: March 5, 1987

ANALYSIS	METHOD	RESULTS
Flash Point	ASTM D97-77	> 150 degrees F
Diesel	*	4300 mg/L
Polychlorinated Biphenyls	**	< 1 mg/kg
Reactivity	---	None Detected
Corrosivity	---	None Detected

* Analysis by Methylene chloride extraction, capillary GC/FID.

** Analysis by GC/ECD and comparison with standard Aroclor solutions.

> denoted "greater than"

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Sincerely,

Susan M. Coffey

Susan M. Coffey, Ph.D.
President

SMC/gs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 19, 1987
Log #A870316-B1-2
PO#: 2842

$285 CF+MW
$210 Crawford

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

Attention: John Shore

Sample ID: #1 - Skookum, 3/13/87
#2 - Yard, 3/13/87

Samples Received: March 13, 1987

SOK ANALYSIS. #1 = Diesel tank at Skookum. #2 = gasoline tank @ Columbia Forge

Samples Collected by: Crosby & Overton

ANALYSIS	SAMPLE #1 (Skookum / Diesel)	SAMPLE #2 (Col. Forge / Gasoline)
Gasoline*	< 1.0	16**
Diesel*	< 1.0	< 1.0
Lead	---	30.0

Results in mg/kg

* Analysis by extraction capillary GC/FID.

** Appears to contain some other high boiling oil and possibly some kerosene.

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved by,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

Soil analysis Yard + Skoo (no lue

SMC/gs

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870309-F

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

SOIL BENEATH GASOLINE TANK, COLUMBIA FORGE

ATTENTION: John Shore

SUBJECT: EP TOXICITY ANALYSIS

METHOD: Federal Register, Vol. 45 No. 98, Monday, May 19, 1980, Rules and Regulations, Appendix II, Page 33127.

FIELD DATA: Sample ID: #2 Tank, 3/9/87, 1230
Collected by: Sample collected and delivered by client.

Sample Received: March 9, 1987

ANALYSIS	RESULTS	LIMIT
Arsenic	< 0.100	5.0
Barium	0.031	100
Cadmium	< 0.010	1.0
Chromium	< 0.010	5.0
Lead	< 0.100	5.0
Mercury	< 0.100	0.2
Selenium	< 0.100	1.0
Silver	< 0.010	5.0

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Results are reported in milligrams per liter (mg/L)

REPORT CONTINUES

Crawford
0800-

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870316-B1-2

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

ATTENTION: John Shore

Soil Beneath Gasoline Tank, Columbia Forge

SUBJECT: EP TOXICITY ANALYSIS

METHOD: Federal Register, Vol. 45 No. 98, Monday, May 19, 1980, Rules and Regulations, Appendix II, Page 33127.

FIELD DATA: Sample ID: #2 - Yard
Collected by: Sample collected and delivered by client.

Sample Received: March 16, 1987

ANALYSIS	RESULTS	LIMIT
Lead	< 0.100	5.0

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Results are reported in milligrams per liter (mg/L)

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870319-K
PO#: 2864

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

Attention: John Shore

SOIL BENEATH DIESEL TANK, COLUMBIA FORGE

Analysis Requested: Total Hydrocarbons

Sample ID: #3 Weld Shop

Sample Date: March 19, 1987

Sample Received: March 19, 1987

ANALYSIS	RESULTS
Gasoline	< 4 mg/kg
Diesel	< 4 mg/kg

Analysis by capillary GC/FID

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

Soil analysis
Weld Shop
(no rush)

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870309-F

Columbia Forge & Machine
Page Two

Attention: John Shore

Analysis Requested: Solvent Scan

Sample ID: #2 Tank, 3/9/87, 1230

CONTENTS / DIESEL TAN
COLUMBIA FORGE

Sample Received: March 9, 1987

ANALYSIS	RESULTS
Acetone	< 500
Chlorobenzene	< 100
M-Dichlorobenzene	< 100
O-Dichlorobenzene	< 100
Ethanol	< 500
Ethyl benzene	< 100
Freon 113	< 100
Isopropyl alcohol	< 500
Methanol	3600
Methylene chloride	< 100
Methyl ethyl ketone	< 300
Methyl isobutyl ketone	< 200
1,1,2,2-Tetrachloroethane	< 100
Tetrachloroethylene	< 100
Toluene	< 100
1,1,1-Trichloroethane	< 100
Trichloroethylene	< 100
Xylene	< 300

Results in mg/L

Analysis by carbon disulfide extraction, GC/FID and methanol extraction GC/HECD.

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

REPORT CONTINUES

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

Crawford

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870309-F

Columbia Forge & Machine
Page Three

CONTENTS, DIESEL TANK, COLUMBIA FORGE

Attention: John Shore

Sample ID: #2 Tank, 3/9/87, 1230

Sample Received: March 9, 1987

ANALYSIS	METHOD	RESULTS
Flash Point	ASTM D97-77 Closed-cup	> 150 degrees F
Reactivity	---	None
Corrosivity	---	None
Gasoline	*	5.0 mg/L
Diesel	*	< 1.0 mg/L

* Analysis by extraction capillary GC/FID.

> denotes "greater than"

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey
President

SMC/gs

liquid yard
not rush

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

APPENDIX 2

Sampling Methods

APPENDIX 2
SAMPLING METHODS

Water Samples; Suspected Fill/Distribution Tank Pipes

The four water samples collected from the suspected tank fill/ distribution pipes at the former sawmill and planing mill were collected using a single check-valve Teflon bailer. Monofilament nylon ("Weedeater") cord was used to lower the bailer in and out of the pipes. The bailer and cord were cleaned before use in each pipe by disassembling the bailer and washing it and the cord with 1) a dilute non-phosphatic detergent solution, 2) a rinse with distilled water, 3) a rinse with methanol, and 4) a final rinse with distilled water. The bailer was also rinsed once with sample water before filling any sample bottles. The tested samples are named AT-1, AT-2, and AT-3. The "AT" means "assumed tank"; the number indicates sample location in the serial order the location was sampled.

Boring and Soil Sample Nomenclature

The borings are named T-1 and T-2. The "T" denotes that it was a reconnaissance, or "test," boring; the number designates the serial order in which the borings were drilled. Soil samples from the borings were labelled S-1, S-2, etc., the "S" indicating a soil sample and the number designating the serial order in which the samples were collected. The shallowest sample is labelled S-1. Soil samples from test pit 7 were named in the same manner.

Drilling Method

The borings were drilled using a truck-mounted CME 55 drilling rig equipped with 3.75-in inside-diameter hollow-stem auger. The rig and crew were from Geo-Tech Explorations (North Plains, OR). The drill rig, downhole equipment and hand tools that contacted the rig or downhole equipment were steam cleaned onsite before drilling the boring. The water used for steam cleaning was obtained from a faucet at Columbia Forge and was stored in a water tank on the rig prior to use.

Soil samples were collected at five-foot intervals using standard split-spoon samplers. The samplers were pushed, not driven, into the soil. The samplers were steam cleaned before their initial use and between borings, but were washed with tap water from the drill rig's water tank between the collection of individual samples in each boring.

The samples were described and logged in the field by a Sweet-Edwards/EMCON geologist. Each sample was described as to soil type(s), moisture content, geologic bedding, its content of manmade objects and its appearance with respect to possible visual evidence of contamination. Each soil sample was placed in a separate "Ziplock"-style plastic bag, labelled as to identity, project and date of collection. The samples were archived.

After the borings were drilled to their final depths and had been sampled for ground water, the borings were abandoned by backfilling with Baroid-brand bentonite chips. The chips were placed by slowly pouring them down the inside of the auger and gradually backpulling the auger until all auger was out of the ground and the boring filled to within one foot of the ground surface. The remaining foot was filled with soil. Cuttings from the borings were left by the boreholes and were smoothed out on the ground using shovels.

Ground Water Sampling Method

Once the water table was reached, as judged by the moisture content of soil samples and drill cuttings, the borings were deepened to provide about four feet of water inside the auger. A small-diameter metal dart-valve bailer was tripped in and out of the auger several times to remove thick, slurry-like cuttings before collecting the ground water samples. A single check-valve Teflon bailer was lowered into the auger to fill with water for the purpose of collecting the actual samples. The bailer was then withdrawn from the auger; its contents were then poured into the sample containers. Monofilament nylon ("Weedeater") cord was used to lower the bailer in and out of the auger. A second water sample was taken at boring T-2. After the first sample was taken, T-2 was deepened 10 feet. However, the driller mistakenly pulled back the auger too much and the bottom of the unsupported borehole collapsed. The result was that the second water sample at T-2 was taken from a shallower depth than originally intended and in fact partly overlapped the depth from which the first sample was taken.

All ground water sampling equipment was cleaned before use by disassembling it and washing it with a dilute non-phosphatic detergent solution, rinsing with distilled water, rinsing with methanol, and rinsing again with distilled water. This applied to the Teflon bailer and the cord used to lower it. The bailer was also rinsed once with sample water before filling any sample bottles.

After collection, the sample bottles were stored on ice and transported to Columbia Analytical Services. Chain of Custody forms were used to track handling of the samples; the relevant custody forms are attached in the original laboratory reports in Appendix 6.

APPENDIX 3

Boring Logs

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT MMI (Lampros Steel Site)

Location See plan **Boring No.** T-1

Surface Elevation Approximately 30ft. **Drilling Method** Hollow-stem auger

Total Depth 41 ft. **Drilled By** Geo-Tech Explorations

Date Completed January 4, 1988 **Logged By** J. Morales

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SOIL SAMPLE NO.	SOIL SAMPLE TYPE	WATER SAMPLE	SYMBOL	LITHOLOGIC DESCRIPTION	WATER LEVEL
Backfilled with bentonite chips		5	S1	SS			4.5-6.0' SILT, 10-15% fine sand, light brown, slightly moist. Dark gray 5.2-6.0 ft. with wood fragments.	
		10	S2	SS			9.5-10.0' SILT, 10-15% fine sand, light brown, slightly moist. Grades down to sand. 10-10.5' FINE SAND, 5-15% silt, <5% clay, light brown, slightly moist, color banding.	
		15	S3	SS			14.5-16.0' SILTY FINE SAND, 30-35% silt, light brown to dark gray, dry, micaceous, sandier with depth.	
		20	S4	SS			19.5-21.0' SILTY FINE SAND, 20-30% silt, green-brown, moist, bedded with bed contact at 20.5 ft.	
		25	S5	SS			24.5-26.0' SANDY SILT, 20% fine sand, brown-green, moist, local laminations, root traces, micaceous.	
		30	S6	SS			29.5-31.0' CLAYEY SILT, 20% clay, brown-green, moist, less clayey with depth.	▽ 34 ft. below ground
		35						

SEA-300-02a

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT MMI (Lampros Steel Site)

Boring No. T-1

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SOIL SAMPLE NO.	SOIL SAMPLE TYPE	WATER SAMPLE	SYMBOL	LITHOLOGIC DESCRIPTION	WATER LEVEL
Backfilled with bentonite chips		35	S7	SS	W-1		34.5-36.0' CLAYEY SILT, <10% fine sand, 60-70% silt, 20-30% clay, brown-green, saturated, mottled.	
		40	S8	SS			39.5-41.0' FINE SAND, 10% silt, blue-green, saturated, micaceous.	
		45					SS = Split Spoon Sample. All soil samples taken by pushing sampler into ground.	

SEA-300-02b

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT MMI (Lampros Steel Site)

Location See plan **Boring No.** T-2

Surface Elevation Approximately 30ft. **Drilling Method** Hollow-stem auger

Total Depth 44.5 ft. **Drilled By** Geo-Tech Explorations

Date Completed January 4, 1988 **Logged By** J. Morales

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SOIL SAMPLE NO.	SOIL SAMPLE TYPE	WATER SAMPLE	SYMBOL	LITHOLOGIC DESCRIPTION	WATER LEVEL
Backfilled with bentonite chips		5	S1	SS			4.5-6.0' MEDIUM-COARSE BLACK SAND, 20% wood fragments, slightly moist.	
		10	S2	SS			9.5-10.5' CLAYEY SILT, 30% clay, blue-green, slightly moist, sticky, interlayered wood waste. Soil is mottled. 10.5-11.0' MEDIUM SAND, 10% silt, dark gray to black, slightly moist.	
		15	S3	SS			14.5-16.0' CLAYEY SILT, 5% fine sand, 20% clay, blue-green, slightly moist, interlayered wood fibers in silt.	
		20	S4	SS			19.5-20.5' CLAYEY SILT, 20% clay, blue-green, moist. 20.5-21.0' SILT, 18% fine sand, dark brown to black mottled, micaceous. Wood fiber banding at 21.0 ft.	
		25	S5	SS			24.5-26.0' CLAYEY SILT, 15-20% clay, glue-green, moist.	
		30	S6	SS			29.5-30.0' CLAYEY SILT, 20-30% clay, green-brown, moist, common laminations and mottling. 30.0-31.0' FINE MEDIUM SAND, 10% silt, dark brown to black, moist.	▽ 32.4 ft. below ground
		35			W-1			

SEA-300-02a

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT MMI (Lampros Steel Site)

Boring No. T-2

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SOIL SAMPLE NO.	SOIL SAMPLE TYPE	WATER SAMPLE	SYMBOL	LITHOLOGIC DESCRIPTION	WATER LEVEL
Backfilled with bentonite chips		35	S7	SS	W-1		34.5-36.0' SILTY FINE SAND, 20-30% silt, light brown, saturated.	
					W-2			
		40	S8	SS			39.5-41.0' SAND, 10% silt, blue-green, saturated, micaceous.	
		45					SS = Split Spoon Sample. All samples taken by pushing sample into ground.	

SEA-300-02b

APPENDIX 4

Ground-penetrating Radar Survey
Williamson and Associates Report

FOET2401.02

WILLIAMSON & ASSOCIATES, INC.

OCEANOGRAPHY AND MARINE GEOPHYSICS

1219 Westlake Ave. N.
Suite 111
Seattle, WA 98109
(206) 282-2396

Sweet, Edwards & Associates, Inc.
P.O. Box, Drawer D
Kelso, WA 98626

January 5, 1988

ATTENTION: Mr. Russ Bunker, R.G.

On December 26th, 1987, Williamson and Associates mobilized a geophysical survey team and a ground penetrating radar system to a site on the Willamete River, near St. Johns Oregon.

The purpose of the geophysical survey was to determine if Ground Penetrating Radar could be used to locate buried utilities, tanks or drums or other anomalous subsurface soil conditions at the site.

A series of test runs were made with the GPR over known targets of known depth, over various surficial soil types and across concrete structures.

Analysis of these data indicated that the GPR was only capable of achieveing 6 to 9 feet of penetration over most of the area of interest. Tests prior to mobilizing and after returning from the site provided 30 feet of penetration assuring us that the system was fully operational. We felt that 15 to 20 feet of penetration was needed to be sure that no subsurface targets were missed.

We believe that the lack of penetration is a result of attenuation by the black-top surface which covers most of the site as well as the sand used for a grinding compound. We were unable to obtain any penetration into the concrete which is probably due to the internal rebar and screening.

We appreciated the opportunity to evaluate the GPR on this project and hope that we will have a chance to work with you again where the results will prove more successful.

Sincerely;

R. E. Sylwester

Williamson and Associates
Richard E. Sylwester
Senior Geophysicist

APPENDIX 5

Electromagnetic (EM) Induction Survey
Geo-Recon Report

GEO RECON INTERNATIONAL

geophysics archeology geology

December 28, 1987

Sweet & Edwards, Inc.
506 Royal Street, West
Kelso, WA 98626

Re: St. Johns, Oregon Plant site.

Gentlemen:

At your request we completed an electromagnetic study of a site in St. Johns, Oregon adjacent to the Willamette River. The purpose of this study was to determine the probability for the existence of buried tanks within the confines of the site. The site was traversed at approximate ten foot spacings and any probable targets were noted on the ground with survey paint. This was accomplished on December 27, 1987 by a two person field crew from Geo Recon.

Four possible targets were located and indicated to your field representative at the end of the study. An area south of the large building floor pad was also noted as having significantly different characteristics than the remainder of the site and may represent different deposits such as wasted concrete containing rebar or other metallic debris. Several subsurface pipes and a buried railroad track were also noted.

We trust this is sufficient for your needs and appreciate the opportunity to work for your firm again.

For: Geo Recon International Ltd.

Clyde A. Ringstad

Clyde A. Ringstad
Principal Geophysicist

P.O.Box 55189 Seattle, Wa. 98155 USA (206) 362-9484

APPENDIX 6

Laboratory Report
Soil and Ground Water Testing

Columbia Analytical Services, Inc.

1152 3rd Avenue • Longview, WA 98632 • (206) 577-7222

Black sand composite sample

February 2, 1988

Randy Sweet
Sweet & Edwards
P.O. Box Drawer B
Kelso, WA 98626

RE: MMI (LAMPROS STEEL SITE); CAS Work Order # 87728

Dear Randy:

Enclosed are the results of samples submitted to our lab on November 11, 1987. For your reference, our service request number for this work is 87728.

Please call if you have any questions.

Respectfully submitted:
COLUMBIA ANALYTICAL SERVICES, INC.

Mike Shelton

Mike Shelton

COLUMBIA ANALYTICAL SERVICES, INC.
1152 3RD AVE. LONGVIEW, WA 98632
(206) 577-7222

CLIENT: Sweet & Edwards
--Randy Sweet
PROJECT: MMI (LAMPROS STEEL SITE)

February 2, 1988
WORK ORDER #: 87728

Analytical Report
mg/L in EP extract

	~~Black Sand~~	Black Sand
Sample Name:		11/11/87
Lab Code:		728-1
Test Parameters	Maximum Level	
Arsenic	5.0	<0.01
Barium	100	0.31
Cadmium	5.0	<0.005
Chromium	5.0	<0.01
Lead	5.0	<0.05
Mercury	0.2	<0.001
Selenium	1.0	<0.01
Silver	5.0	<0.01

Approved by: Mike O'Kelley Date: 2/2/88

Columbia Analytical Services, Inc.

1152 3rd Avenue • Longview, WA 98632 • (206) 577-7222

February 2, 1988

T24C1.02
(Suspected Trash Fill Pipes for Samples)

Russ Bunker
Sweet & Edwards
P.O. Box 328
Kelso, WA 98626

RE: MMI (LAMPROS STEEL SITE)

Dear Russ:

Listed below are the results of samples submitted to our lab on December 22, 1987. For your reference, our service request number for this work is 87817.

Please call if you have any questions.

Analytical Report
mg/L

Sample Name:	AT-3	AT-4	AT-5
Lab Code:	817-1	817-2	817-3
pH	5.8	5.5	5.9
Conductivity umhos/cm	80	68	88

Respectfully submitted:
COLUMBIA ANALYTICAL SERVICES, INC.

Mike Shelton

Mike Shelton

[illegible] Inc
Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0415

Laboratory Analysis Request

DATE 11/[illegible]/84 PAGE 1 OF 1

PROJECT [illegible] Trading # [illegible]
CLIENT INFO. CONTACT [illegible]
ADDRESS —
TELEPHONE# —
SAMPLERS NAME Bunker PHONE# 206-[illegible]
SAMPLERS SIGNATURE R. Bunker

ANALYSIS REQUESTED — GENERAL CHEMISTRY (Specify) — OTHER (Specify)

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	volatiles	PCBs					NUMBER OF CONTAINERS
1. AT-3	12/21/87	1315	817-1	WTR														✓						2
2. AT-3	"	"	-1	"									✓											1
3. AT-3	"	"	-1	"														✓						1
4.																								
5.																								
6.																								
7.																								
8.																								

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By
R. Bunker		
Signature: Russell C. Bunker	Signature	Signature
Printed Name: Sweet-Edwards	Printed Name	Printed Name
Firm: 12/21/87 1720	Firm	Firm
Date/Time	Date/Time	Date/Time
Received By: [illegible]	Received By	Received By
Signature: [illegible]	Signature	Signature
Printed Name: [illegible]	Printed Name	Printed Name
Firm: [illegible]	Firm	Firm
Date/Time	Date/Time	Date/Time

PROJECT INFORMATION

Shipping I.D. No.

VIA

Project

SAMPLE RECEIPT

Total No. of Containers

Chain of Custody Seals

Received in good condition

LAB NO.

SPECIAL INSTRUCTIONS/COMMENTS

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

SEA-400-05

CRAW0004767

Swet, Edwards & Associates, Inc.
Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0415

Laboratory Analysis Request

DATE 12/21/17 PAGE 1 OF 1

PROJECT Hank Trading # T24 C1 C2
CLIENT INFO. CONTACT Kim Hill
ADDRESS –
TELEPHONE# –
SAMPLERS NAME R Bunker PHONE# 206-423-3580
SAMPLERS SIGNATURE R Bunker

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	volatiles	PCBs					NUMBER OF CONTAINERS
1. AT-4	12/21/17	1345	817-2	WTR														✓						2
2. AT-4	"	"	-2	"															✓					1
3. AT-4	"	"	-2	"								✓												1
4.																								
5.																								
6.																								
7.																								
8.																								

ANALYSIS REQUESTED — GENERAL CHEMISTRY (Specify) — OTHER (Specify)

Relinquished By Swet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature R Bunker	Signature	Signature		
Printed Name Russ Bunker	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm Swet-Edwards	Firm	Firm	VIA	Chain of Custody Seals
Date/Time 12/21/17 1720	Date/Time	Date/Time	Project	Received in good condition
				LAB NO.
Received By	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature	Signature	Signature		
Printed Name	Printed Name	Printed Name		
Firm	Firm	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

SEA-400-05

Swe[illegible] Edw[illegible]s & [illegible]ociates, Inc.
Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0415

Laboratory Analysis Request

DATE 12/21/87 PAGE 1 OF 1

PROJECT [illegible] #T74c1.2
CLIENT INFO. CONTACT [illegible]
ADDRESS —
TELEPHONE# —
SAMPLERS NAME R Pinker PHONE# 206-423-3580
SAMPLERS SIGNATURE RCPinker

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	Volatiles	PCB				NUMBER OF CONTAINERS
1. AT-5	12/21/87	1400	817-3	WTR														✓					2
2. AT-5	"	"	-3	"															✓				1
3. AT-5	"	"	-3	"									✓										1
4.																							
5.																							
6.																							
7.																							
8.																							

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature RCPinker	Signature	Signature		Total No. of Containers
Printed Name Russ Pinker	Printed Name	Printed Name	Shipping I.D. No.	Chain of Custody Seals
Firm Sweet-Edwards	Firm	Firm	VIA	Received in good condition
Date/Time 12/21/87 1720	Date/Time	Date/Time	Project	LAB NO.
Received By [illegible]	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature [illegible]	Signature	Signature		
Printed Name [illegible]	Printed Name	Printed Name		
Firm [illegible]	Firm	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

SEA-400-05

Columbia Analytical Services, Inc.

1152 3rd Avenue • Longview, WA 98632 • (206) 577-7222

T24C1.02

(Ground-water samples, Test borings, T-1, T-2)

February 2, 1988

Russ Bunker
Sweet & Edwards
P.O. Box Drawer B
Kelso, WA 98626

Ground water samples from T-1, T-2 borings

RE: MMI (LAMPROS STEEL SITE)

Dear Russ:

Listed below are the results of samples submitted to our lab on January 5, 1987. For your reference, our service request number for this work is 88002.

Please call if you have any questions.

Analytical Report

		Drainfield	— Black Sand —	
Sample Name:		T-1/W-1	T-2/W-1	T-2/W-2
Lab Code:		002-1	002-2	002-3
Nitrate-N	mg/L	2.4	0.14	0.10
Total Organic Carbon	mg/L	2.0	25	56
TOX	ppb	<5	11.5	13.8

Respectfully submitted:
COLUMBIA ANALYTICAL SERVICES, INC.

Mike Shelton

Mike Shelton

Sweet, Edwards & Associates, Inc.
Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0416

Laboratory Analysis Request

DATE 1-5-88 PAGE 1 OF 1

PROJECT Acme Trading # T2401.02
CLIENT INFO. CONTACT Russ Bunker
ADDRESS Sweet-Edwards / EMCON
TELEPHONE# 206-423-3580
SAMPLERS NAME R Bunker PHONE# 206-423-3580
SAMPLERS SIGNATURE R Bunker

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	NO_3, TOC	TOX					NUMBER OF CONTAINERS
1. T-1/W-1	1-4-88	1140	002-1	WTR													✓						1
2. T-1/W-1	"	1140	002-1	WTR														✓					1
3. T-2/W-1	"	1600	002-2	WTR													✓						1
4. T-2/W-1	"	1600	002-2	WTR														✓					1
5. T-2/W-2	"	1700	002-3	WTR													✓						1
6. T-2/W-2	"	1700	002-3	WTR														✓					1
7.																							
8.																							

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature R C Bunker	Signature	Signature		
Printed Name Russ Bunker	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm Sweet-Edwards	Firm	Firm	VIA	Chain of Custody Seals
Date/Time 1-5-88 1015	Date/Time	Date/Time	Project	Received in good condition
				LAB NO.
Received By Sid Vincent	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature Steve Vincent	Signature	Signature	Analyze wtr from settled sample, i.e., do not test sediment	
Printed Name CAS	Printed Name	Printed Name		
Firm 1-5-88 1015	Firm	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

SEA-400-05

CRAW0004771

Columbia Analytical Services, Inc.

1152 3rd Avenue • Longview, WA 98632 • (206) 577-7222

February 2, 1988

Test Pit Soil Samples
Drainfield
Black Sand

Russ Bunker
Sweet & Edwards
P.O. Box Drawer B
Kelso, WA 98626

RE: MMI (LAMPROS STEEL SITE)

Dear Russ:

Enclosed are the results of samples, including PCB results, submitted to our lab on January 6, 1988. For your reference, our service request number for this work is 88012.

Please call if you have any questions.

Respectfully submitted:
COLUMBIA ANALYTICAL SERVICES, INC.

Colin Elliot /mls

Colin Elliott

COLUMBIA ANALYTICAL SERVICES, INC.
1152 3RD AVE. LONGVIEW, WA 98632
(206) 577-7222

CLIENT: Sweet & Edwards
--Russ Bunker

February 2, 1988

PROJECT: MMI (LAMPROS STEEL SITE)

WORK ORDER #: 88012

Analytical Report
(dry basis)

Sample Name	Lab Code	Oil & Grease %	TOX ppm	PCB ppm
TP-1/S-1	012-1	<0.01	<2	-
TP-4/S-2 Dranfield	012-2	<0.01	<2	-
TP-7/S-1 Black Sand	012-3	0.04	294	<0.2
TP-7/S-2	012-4	0.05	2.9	-

Approved by: Mike Skelton Date: 2/2/88

COLUMBIA ANALYTICAL SERVICES, INC.
1152 3RD AVE. LONGVIEW, WA 98632
(206) 577-7222

CLIENT: Sweet & Edwards
--Russ Bunker
February 2, 1988

PROJECT: MMI (LAMPROS STEEL SITE)
WORK ORDER #: 88012

Volatile Organics Results
ug/Kg (ppb)

Sample Name:	TP-1/S-1	TP-4/S-1 Dranfield	TP-7/S-1 Black Sand	TP-7/S-2
Lab Code:	012-1	012-2	012-3	012-4
Chloromethane	<50	<50	<50	<50
Vinyl Chloride	<50	<50	<50	<50
Bromomethane	<50	<50	<50	<50
Chloroethane	<50	<50	<50	<50
1,1-Dichloroethene	<50	<50	<50	<50
Methylene Chloride	<200	<200	<200	<200
Trans 1,2-Dichloroethene	<50	<50	<50	<50
1,1-Dichloroethane	<50	<50	<50	<50
Chloroform	<50	<50	<50	<50
1,1,1-Trichloroethane	<50	<50	<50	<50
Carbon Tetrachloride	<50	<50	<50	<50
Benzene	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	<50	<50
Trichloroethene	<50	<50	<50	<50
1,2-Dichloropropane	<50	<50	<50	<50
Bromodichloromethane	<50	<50	<50	<50
2-Chloroethylvinyl ether	<500	<500	<500	<500
Trans 1,3-Dichloropropene	<50	<50	<50	<50
Toluene	<50	<50	<50	<50
Cis 1,3-Dichloropropene	<50	<50	<50	<50
1,1,2-Trichloroethane	<50	<50	<50	<50
Tetrachloroethene	<50	<50	<50	<50
Dibromochloromethane	<50	<50	<50	<50
Chlorobenzene	<50	<50	<50	<50
Ethylbenzene	<50	<50	<50	<50
Bromoform	<50	<50	<50	<50
1,1,2,2-Tetrachloroethane	<50	<50	<50	<50
1,3 Dichlorobenzene	<50	<50	<50	<50
1,4 Dichlorobenzene	<50	<50	<50	<50
1,2 Dichlorobenzene	<50	<50	<50	<50
Acetone	<500	<500	<500	<500
Total xylenes	<100	<100	310	<100
Methyl Ethyl Ketone	<500	<500	<500	<500
Methyl Isobutyl Ketone	<500	<500	<500	<500

Approved by: Mike Dalton Date: 2/2/88

Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0415

Laboratory Analysis Request

DATE 1-6-88 PAGE 2 OF 2

PROJECT Nome Tailing # T2401.02
CLIENT INFO. CONTACT RBunkee
ADDRESS Sweet-Edwards
TELEPHONE# 206-423-3580
SAMPLERS NAME RBunkee PHONE# 206-423-3580
SAMPLERS SIGNATURE RBunkee

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	BTEX, BOZO VOLS.	TOX; oil & grease		PCB (CBE)			NUMBER OF CONTAINERS
1. TP-5/S-1	1/6/88	0950		SOIL														✓						1
2. TP-5/S-1	"	0950		"															✓					1
3. TP-7/S-1	"	1025		"														✓			✓			1
4. TP-7/S-1	"	1025		"															✓					1
5. TP-7/S-2	"			"														✓						1
6. TP-7/S-2	"			"															✓					1
7.																								
8.																								

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature RBunkee	Signature	Signature		
Printed Name Russ Bunkee	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm Sweet-Edwards	Firm	Firm	VIA	Chain of Custody Seals
Date/Time 1-6-88, 1545	Date/Time	Date/Time	Project	Received in good condition
Received By	**Received By**	**Received By**		LAB NO.
Signature	Signature	Signature	**SPECIAL INSTRUCTIONS/COMMENTS**	
Printed Name CHS	Printed Name	Printed Name	As of today (1/6/88) analyze only:	
Firm	Firm	Firm	① TP-1/S-1	
Date/Time	Date/Time	Date/Time	② TP-4/S-2	
			③ TP-7/S-1	
			TP-7/S-2	

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

SEA-400-05

CRAW0004775

Columbia Analytical Services, Inc.

1152 3rd Avenue • Longview, WA 98632 • (206) 577-7222

FEB 03 1988

Contents of UST at TP-2

February 2, 1988

Russ Bunker
Sweet & Edwards
P.O. Box Drawer B
Kelso, WA 98626

RE: MMI (LAMPROS STEEL SITE)

Dear Russ:

Enclosed are the results of samples submitted to our lab on January 12, 1988 for rush analysis. For your reference, our service request number for this work is 88023.

Please call if you have any questions.

Respectfully submitted:
COLUMBIA ANALYTICAL SERVICES, INC.

Mike Shelton

Mike Shelton

COLUMBIA ANALYTICAL SERVICES, INC.
1152 3RD AVE. LONGVIEW, WA 98632
(206) 577-7222

Contents of UST at TP-2

CLIENT: Sweet & Edwards
--Russ Bunker

February 2, 1988

PROJECT: MMI (LAMPROS STEEL SITE)

WORK ORDER #: 88023

Analytical Report

Sample Name: Lab Code:	Units	Columbia Forge 023-1
Organic Constituents		
PCB	mg/kg	<0.5
Benzene	mg/kg	<1.0
Toluene	mg/kg	5.72
Ethyl Benzene	mg/kg	10.3
Total Xylene	mg/kg	85.0
Total TCP	mg/kg	<0.035
Pentachlorophenol	mg/kg	<0.010
TOX	mg/kg	32
Metals		
Antimony	mg/kg	<1
Arsenic	mg/kg	<1
Beryllium	mg/kg	<4
Cadmium	mg/kg	<1
Chromium	mg/kg	<2
Copper	mg/kg	60
Lead	mg/kg	<10
Mercury	mg/kg	<0.5
Nickel	mg/kg	63
Selenium	mg/kg	<1
Silver	mg/kg	<10
Thallium	mg/kg	<1
Zinc	mg/kg	<8

Approved by: Mike Fulton Date: 2/2/88

COLUMBIA ANALYTICAL SERVICES, INC.
1152 3RD AVE. LONGVIEW, WA 98632
(206) 577-7222

CLIENT: Sweet & Edwards
--Russ Bunker
PROJECT: MMI (LAMPROS STEEL SITE)

February 2, 1988
WORK ORDER #: 88023

Analytical Report

Sample Name: Lab Code:	Units	Columbia Forge 023-1
Other Constituents		
TSS	%	11
Water	%	<0.2

Corrosivity

The pH of this non-aqueous sample is 5.0.

Ignitability

Closed cup flash point was greater than 140 deg. F.

Reactivity

Sample Characteristics

Will not detonate.
Does not react violently with water.
Does not generate sulfides upon acidification.
Cyanides found to be less than 1.0 mg/kg.

Approved by: Mike Shelton Date: 2/2/88

Sweet, Edwards & Associates, Inc.
Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0415

Chain of Custody / Laboratory Analysis Request

DATE 1-11-88 PAGE _____ OF _____

PROJECT _____ # T2401.02

CLIENT INFO. CONTACT Howard Holmes / NW Testing Labs

ADDRESS 5405 N. Lagoon Ave.

TELEPHONE# 503-289-1778

SAMPLERS NAME _____ PHONE# _____

SAMPLERS SIGNATURE _____

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	GENERAL CHEMISTRY (Specify): pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	OTHER (Specify)	NUMBER OF CONTAINERS
1. Columbia Forge				01															
2.																			
3.																			
4.																			
5.																			
6.																			
7.																			
8.																			

Relinquished By	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature: Howard B Holmes	Signature: [illegible]	Signature	Shipping I.D. No.	Total No. of Containers
Printed Name: Howard B. Holmes	Printed Name	Printed Name	VIA	Chain of Custody Seals
Firm: Northwest Testing Labs	Firm: [illegible] 0830	Firm	Project	Received in good condition
Date/Time: Jan 11, 1988 / 1630	Date/Time	Date/Time		LAB NO.
Received By	**Received By**	**Received By**	**SPECIAL INSTRUCTIONS/COMMENTS**	
Signature: [illegible]	Signature: [illegible]	Signature		
Printed Name: [illegible]	Printed Name: CAS	Printed Name		
Firm: JAN 11 1988 [illegible]	Firm: 1/12/88 0813	Firm		
Date/Time	Date/Time	Date/Time		

DISTRIBUTION: WHITE - return to originator YELLOW - lab: PINK - retained by originator

CRAW0004779

Columbia Analytical Services, Inc.

1152 3rd Avenue • Longview, WA 98632 • (206) 577-7222

FEB 03 1988

February 2, 1988

Russ Bunker
Sweet & Edwards
P.O. Box Drawer B
Kelso, WA 98626

Soil samples from UST excavation at TP-2

RE: MMI (LAMPROS STEEL SITE)

Dear Russ:

Listed below are the results of samples submitted to our lab on January 19, 1988. For your reference, our service request number for this work is 88039.

Please call if you have any questions.

Analytical Report
Units = % As Rec'd

Sample Name	Lab Code	Oil & Grease	Solids
Tank 1	039-1	0.01 100 mg/kg	75.2
Tank 2	039-2	0.02 200 mg/kg	89.5
Tank 3	039-3	0.02 100 mg/kg	78.5

Respectfully submitted:
COLUMBIA ANALYTICAL SERVICES, INC.

Mike Shelton

Mike Shelton

Sweet, Edwards & Associates, Inc.
Kelso, WA (206) 423-3580
Redmond, WA (206) 881-0415

Chain of Custody / Laboratory Analysis Request

DATE 1-15-90 PAGE 1 OF 1

PROJECT _____ #_____
CLIENT INFO.
CONTACT _____
ADDRESS _____
TELEPHONE# _____
SAMPLERS NAME _____ PHONE# _____
SAMPLERS SIGNATURE _____

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	GENERAL CHEMISTRY (Specify) pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	OTHER (Specify)						NUMBER OF CONTAINERS
1.																								
2.																								
3.																								
4.																								
5.																								
6.																								
7.																								
8.																								

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature	Signature	Signature		
Printed Name	Printed Name	Printed Name	Shipping I.D. No.	Total No. of Containers
Firm	Firm	Firm	VIA	Chain of Custody Seals
Date/Time	Date/Time	Date/Time	Project	Received in good condition
				LAB NO.

Received By	Received By	Received By	SPECIAL INSTRUCTIONS/COMMENTS
Signature	Signature	Signature	
Printed Name	Printed Name	Printed Name	
Firm	Firm	Firm	
Date/Time	Date/Time	Date/Time	

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

SEA-400-05

CRAW0004781

Appendix E

APPENDIX E

ANALYTICAL LABORATORY REPORT FOR UNDERGROUND STORAGE TANK REMOVAL SOIL SAMPLES

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 19, 1987
Log #A870316-B1-2
PO#: 2842

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

Attention: John Shore

Sample ID: #1 - Skookum, 3/13/87
#2 - Yard, 3/13/87

Samples Received: March 13, 1987

Samples Collected by: Crosby & Overton

ANALYSIS	SAMPLE #1	SAMPLE #2
Gasoline*	< 1.0	16**
Diesel*	< 1.0	< 1.0
Lead	---	30.0

Results in mg/kg

* Analysis by extraction capillary GC/FID.

** Appears to contain some other high boiling oil and possibly some kerosene.

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved by,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

Soil anal. yard

SMC/gs

This report is for the sole and exclusive use of the above client. (no
Samples are retained a maximum of 15 days from the date of this letter.

B 11587

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870316-B1-2

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

ATTENTION: John Shore

SUBJECT: EP TOXICITY ANALYSIS

METHOD: Federal Register, Vol. 45 No. 98, Monday, May 19, 1980, Rules and Regulations, Appendix II, Page 33127.

FIELD DATA: Sample ID: #2 - Yard
Collected by: Sample collected and delivered by client.

Sample Received: March 16, 1987

ANALYSIS	RESULTS	LIMIT
Lead	< 0.100	5.0

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Results are reported in milligrams per liter (mg/L)

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

ordered with for YC
2nd soil ok
1/c only E
drive

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

B 11588

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

March 24, 1987
Log #A870319-K
PO#: 2864

Columbia Forge & Machine
8424 N. Crawford St.
Portland, Oregon 97203

Attention: John Shore

Analysis Requested: Total Hydrocarbons

Sample ID: #3 Weld Shop

Sample Date: March 19, 1987

Sample Received: March 19, 1987

ANALYSIS	RESULTS
Gasoline	< 4 mg/kg
Diesel	< 4 mg/kg

Analysis by capillary GC/FID

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

Approved,

Susan M. Brillante

Susan M. Brillante,
Laboratory Director

Sincerely,

Susan M. Coffey

Susan M. Coffey
President

SMC/gs

soil anal.
weld st
(no r.

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

B 11592

Appendix F

APPENDIX F

EXPLORATION LOCATIONS ON PROPERTY EAST OF THE CSC SITE

LEVEL II

ENVIRONMENTAL SITE ASSESSMENT

ST. JOHNS RIVERFRONT PROPERTY

PORTLAND, OREGON

Prepared for

GRAYCO RESOURCES, INC.

March 15, 1989

CSA CUMMINGS, SENKEL & ASSOCIATES
CONSULTING ENGINEERS

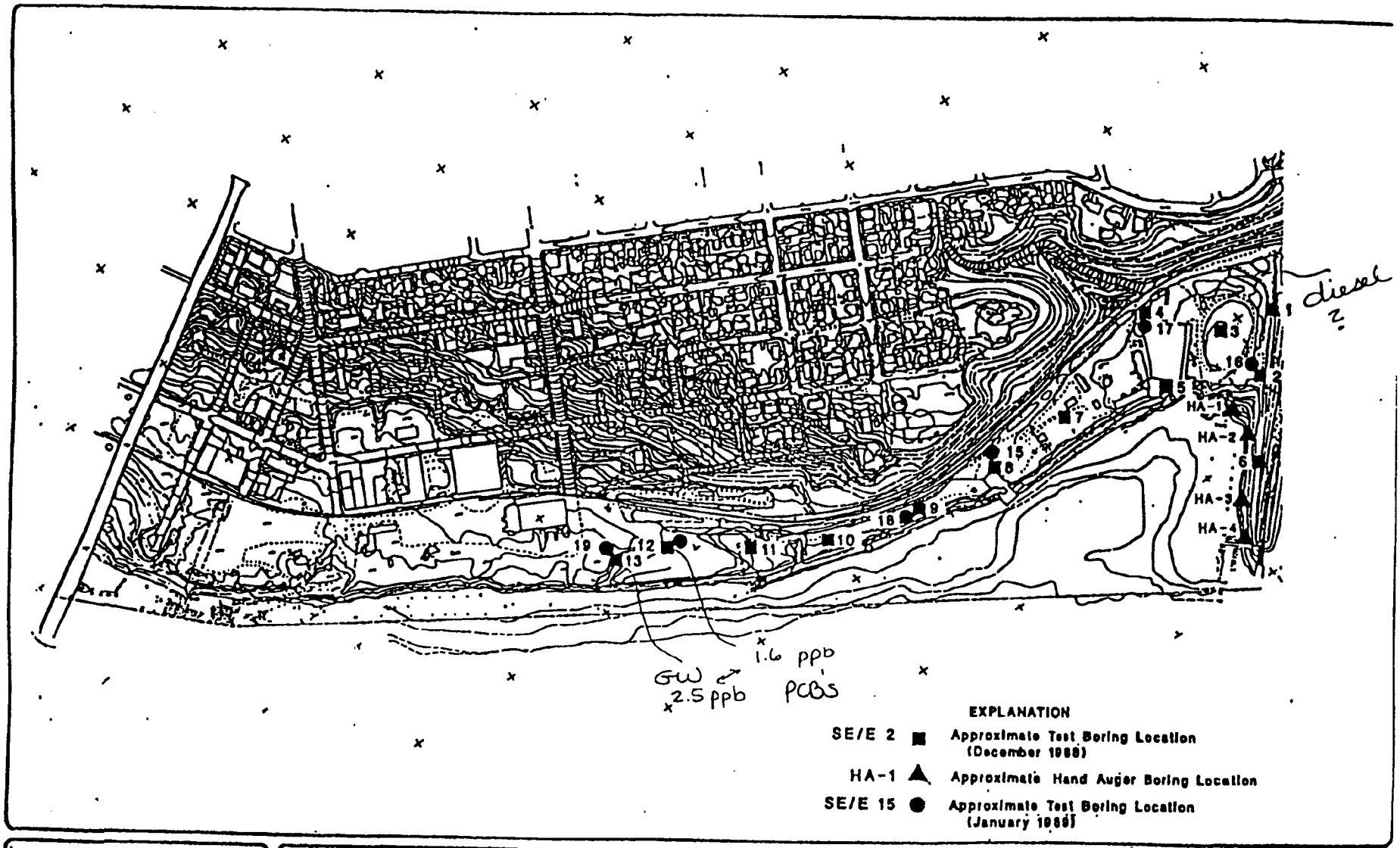
HARVEY L. CUMMINGS, P.E.
Principal

250 W. Clarendon, Gladstone, Oregon 97027
(503) 557-0506 Fax (503) 659-1040

SWEET-EDWARDS/EMCON, INC.
7504 S.W. Bridgeport Rd.
Portland, OR 97224

GRAYCO-R.315 LK
T8701.01

Rev. 1 3/15/89



Sweet-Edwards EMCON

0 350 700
Scale in Feet

N

GRAYCO/ST. JOHNS RIVERFRONT PROPERTY
Test Boring and Hand Auger Boring Location Map

Figure 8

DATE 11-15-88
DWN. MM
APPR. SPH
REVIS.
PROJECT NO

CRAV00004790

LOG OF EXPLORATORY BORING

PROJECT NAME GRAYCO Portland, Oregon
LOCATION See Figure
DRILLED BY Geo Tech Exploration
DRILL METHOD H.S. Auger
LOGGED BY R.A. Dixon

BORING NO. SE/E-13
PAGE 1 OF 1
REFERENCE ELEV. ±
TOTAL DEPTH 35.00'
DATE COMPLETED 12/9/88

SAMPLE NUMBER	PERCENT RECOVERY	BLOW COUNT (N COMP)	LITHOLOGIC DESCRIPTION
			0-5.5' Sandy clayey SILT, black, low to medium plasticity, wet (ML).
S-1	60	2-30 (NA)	5.5-6.5' Brick Rubble.
			6.5-10.5' SIlty CLAY, black, moderate to high plasticity, moist to wet (OH).
S-2	90	4-9-12 (21)	10.5-15' Sandy silty CLAY, light brown, moderate plasticity, moist (CL). - - - red brick rubble at 11.25 to 11.5 feet.
S-3	95	3-7-8 (15)	15-20' Silty clayey SAND, light brown, fine grained, moist (SM).
S-4	65	4-6-8 (14)	20-25' Poorly graded SAND, grayish-brown, fine grained, trace silt, moist (SP).
S-5	100	2-4-4 (8)	25-30.5' Sandy silty CLAY, brownish-gray, moderate to high plasticity, moist (CL). - - - first encountered water at 30.5 feet.
S-6	120	3-5-8 (13)	30.5-35' clayey silty SAND, grayish-brown, fine to medium grained, oily sheen on water and 30 foot soil sample, saturated (SM). Bottom of boring at 35 feet.

GROUND WATER LEVELS ▽ 30.5'

DEPTH IN FT. 5 10 15 20 25 30 35

SAMPLES

WELL DETAILS

LITHOLOGIC COLUMN

REMARKS

Sampled ground water through 2" PVC Screen and casing with teflon bailer. Pulled PVC after sampling. Minor oily sheen on water sample. Drilled to 35 feet to enhance sampling. Backfilled with bentonite.

SWEET-EDWARDS/EMCON

T8701...GRAYC.JLG.010689

LOG OF EXPLORATORY BORING

PROJECT NAME	GRAYCO Portland, Oregon	BORING NO.	SE/E-19
LOCATION	See Figure	PAGE	1 OF 1
DRILLED BY	Geo Tech Exploration	REFERENCE ELEV.	±
DRILL METHOD	H.S. Auger	TOTAL DEPTH	31.50'
LOGGED BY	S. Ryman	DATE COMPLETED	1/27/89

SAMPLE NUMBER	PERCENT RECOVERY	BLOW COUNT (N COMP)	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				5				0-31.5' SAND, brown, medium-to-fine with minor silt, 15% silt, 30% medium sand, 55% fine, moist.
				10				
				15				
				20				
				25				
S-1		2-3-4	▽ 30.5'	30				--- color change to gray at 30 feet. --- first encountered water at 30.5 feet.
								Bottom of boring at 31.5 feet.
				35				

REMARKS

Drilled adjacent to SE/E-3.

SWEET-EDWARDS/EMCON

T8701.01.CRAYC.JLG.020789

TABLE 3
GRAYCO/ST. JOHNS RIVERFRONT PROPERTY
GROUND WATER SAMPLE TESTING PARAMETERS

SAMPLE I.D.	SAMPLE COLLECTION DATE	PRIORITY POLLUTANT METALS*	TOX	PCB	PAH	PENTA-CHLORO-PHENOL	VOLATILE ORGANICS METHOD 601	PESTICIDES METHOD 608	VOLATILE ORGANICS METHOD 624	BASE NEUTRAL EXTRACTABLES METHOD 625	HYDROCARBON SCAN METHODS 3510/8015 MODIFIED
SE/E-1	12/5/88	X	X	X	X	X					
SE/E-2	12/5/88	X		X	X	X			X	X	
SE/E-3	12/6/88	X	X	X	X	X					
SE/E-4	12/6/88	X	X	X	X	X					
SE/E-5	12/6/88	X	X	X	X	X					
SE/E-6	12/7/88	X		X	X	X			X	X	
SE/E-7	12/7/88	X	X	X	X	X					
SE/E-8	12/7/88	X	X	X	X	X					
SE/E-9	12/8/88	X	X	X	X	X					
SE/E-10	12/8/88	X	X	X	X	X					
SE/E-11	12/8/88	X	X	X	X	X					
SE/E-12	12/9/88	X	X	X	X	X					
SE/E-13	12/9/88	X	X	X	X	X					
SE/E-14	1/26/89			X**							
SE/E-17	1/26/89	X**					X	X			
SE/E-19	1/27/89			X[1]							X[2]
HA-4W	12/12/88	X	X	X	X	X					

NOTE:
TOX = Total Organic Halides
PCB = Polychlorinated Biphenols
PAH = Polyaromatic Hydrocarbons
* = Samples SE/E-1 through SE/E-5 were not field filtered.
** = Filtered and unfiltered samples collected.
1 = Filtered water sample and unfiltered water with concentrated oil sheen.
2 = Test conducted on oil from SE/E 19 unfiltered water sample.

GRAYC-T3.315 PE
T8701.01

TABLE 4, continued

BORING I.D.	SAMPLE I.D.	SAMPLE INTERVAL ft.	DATE COLLECTED	DATE SCREENED	PID*	SAMPLE SUBMITTED FOR TESTING	COMPOSITE SAMPLE IDENTIFICATION
SE/E-13	SE/E-13-5	5-6.5	12/9/88	12/10/88	49	**	SE/E-13-A
	SE/E-13-10	10-11.5	12/9/88	12/10/88	48	**	
	SE/E-13-15	15-16.5	12/9/88	12/10/88	51	X	
	SE/E-13-20	20-21.5	12/9/88	12/10/88	18	**	SE/E-13-B
	SE/E-13-25	25-26.5	12/9/88	12/10/88	35	**	
SE/E-14	SE/E-14	30.5-32	1/26/89	NA	NA	X	NA
SE/E-15	SE/E-15-20	20-21.5	1/26/89	NA	NA	X	NA
SE/E-16	SE/E-16-10	10-11.5	1/26/89	NA	NA	X	NA
SE/E-19	SE/E-19-30	30-31.5	1/27/89	NA	NA	X	NA

NOTE:

*PID = Photoionization detector
NA = Not applicable

GRAYC-T4.315 PE
T8701.01

TABLE 5
GRAYCO-ST. JOHNS RIVERFRONT PROPERTY
SOIL QUALITY LABORATORY RESULTS

SAMPLE I.D.	PCB (mg/kg)	TOX (mg/kg)	OIL AND GREASE (%)	BTEX METHOD 820 (mg/kg)	HYDROCARBON SCAN (mg/kg)
SE/E-1-10	ND	1	<0.02		
SE/E-2-10	ND	2	0.068		
SE/E-3-10	ND	ND	<0.02		
SE/E-4-20	ND	ND	<0.02		
SE/E-5-10	ND	ND	<0.02		
SE/E-6-20	ND	ND	<0.02		
SE/E-7-10	ND	1	<0.02		
SE/E-8-20	ND	1	0.054		
SE/E-9-15	ND	ND	<0.02		
SE/E-10-25	ND	ND	<0.02		
SE/E-11-15	ND	ND	<0.02		
SE/E-12-A*	ND				
SE/E-12-15	ND	ND	<0.02		
SE/E-12-B*	ND				
SE/E-13-A*	ND				
SE/E-13-10	ND	1	<0.02		
SE/E-13-B*	ND				
SE/E-14	ND				
SE/E-15-20				ND	ND
SE/E-16-10				ND	ND
SE/E-17	No soil samples taken.				
SE/E-18	No soil samples taken.				
SE/E-19-30	ND			ND	ND
HA-1*	ND	1	<0.02		
HA-2*	ND	2	0.052		
HA-3*	ND	ND	0.056		
HA-4*	ND	ND	<0.02		
Detection Limits	1.0	1.0	0.02	.05	5

GRAYC-T5.315 PE
T8701.01

Table 5 (Continued)

NOTE:

PCB = Polychlorinated Biphenyl
TOX = Total Organic Halides
BTEX = Benzene, Toluene, Ethylbenzene, Xylene
Hydrocarbon Scan - Diesel, Gasoline
C = Composite Soil Samples

GRAYC-T5.315.PE
T8701.01

TABLE 6
GRAYCO-ST. JOHNS RIVERFRONT PROPERTY
GROUND WATER QUALITY LABORATORY RESULTS
SELECT ORGANIC CONSTITUENTS (ug/L)

SAMPLE I.D.	PCB	TOX	PAH	PENTA-CHLORO-PHENOL	PESTICIDES METHOD 608	VOLATILE ORGANICS METHOD 601
SE/E-1	ND	39	ND	ND	-	-
SE/E-2	ND	*	ND	ND	-	-
SE/E-3	ND	34	ND	ND	-	-
SE/E-4	ND	44	ND	ND	-	-
SE/E-5	ND	21	ND	ND	-	-
SE/E-6	ND	*	ND	ND	-	-
SE/E-7	ND	26	ND	ND	-	-
SE/E-8	ND	13	ND	ND	-	-
SE/E-9	ND	28	ND	ND	-	-
SE/E-10	ND	14	ND	ND	-	-
SE/E-11	ND	12	ND	ND	-	-
SE/E-12	2.5	7	ND	ND	-	-
SE/E-13	1.6	17	ND	ND	-	-
SE/E-14	ND**	-	-	-	-	-
SE/E-17	-	-	-	-	ND	ND
SE/E-19	ND***	-	-	-	-	-
HA-4	ND	45	ND	ND	-	-
Detection Limits	1[1]	5	1	10	Variable	Variable

GRAYC-T6.315 PE
T8701.01

Table 6 (continued)

NOTE:

Detection Limits 0.2
* = Tested for volatile and semivolatile organic compounds, Methods 8240 and 8270. No compounds were detected.
** = Filtered and unfiltered sample
*** = Filtered water and unfiltered water with concentrated oil sheen tested.
- = Not tested.
1 = Detection limit for oil contaminated sample from SE/E 19 was 1 ppm.
PCB = Polychlorinated Biphenyl (Total Arachlor)
TOX = Total Organic Halides
PAH = Polyaromatic Hydrocarbons

GRAYC-T6.315 PE
T8701.01

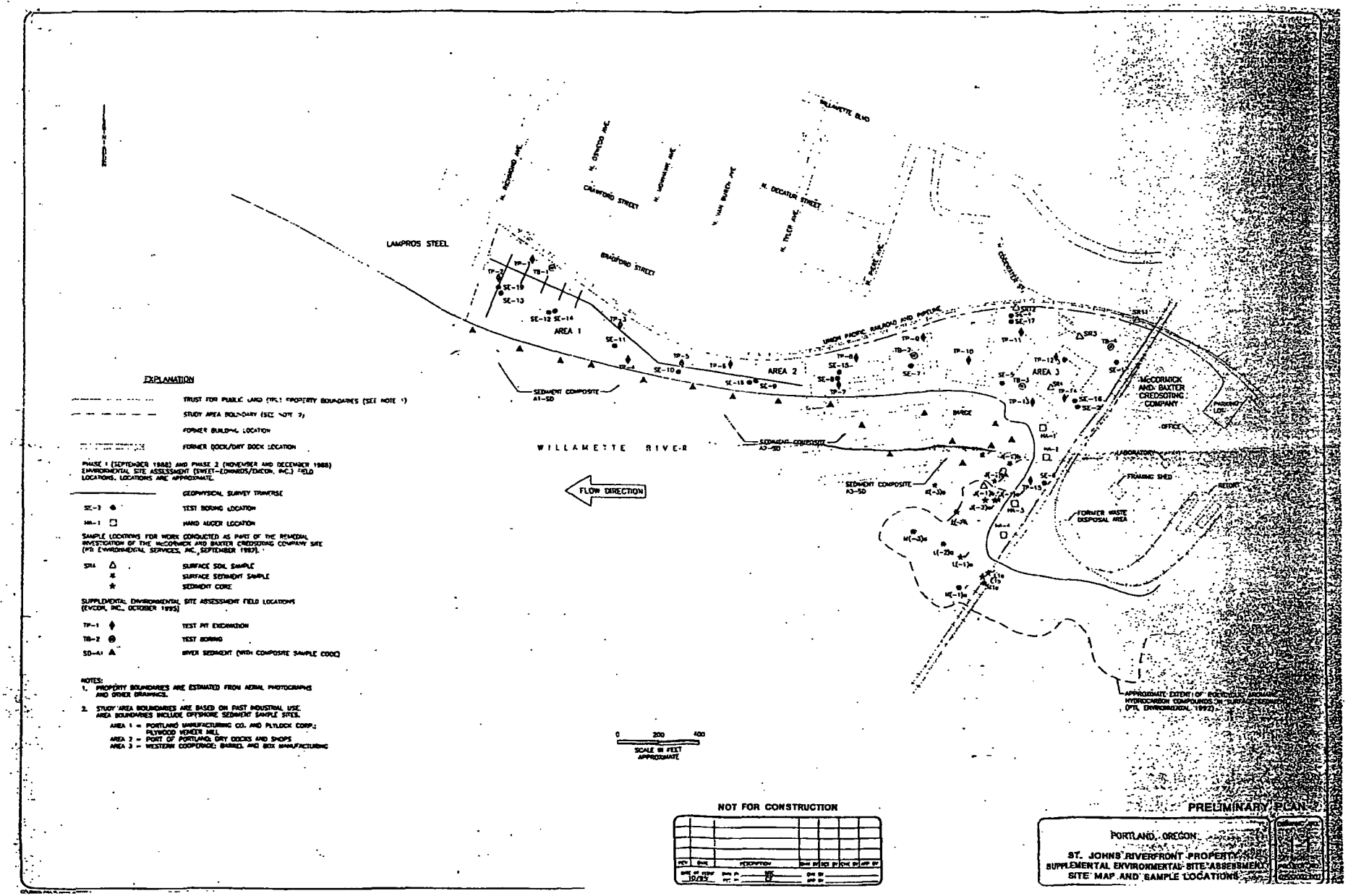


Table 5-2

Summary of Soil Samples Collected and Laboratory Analysis
Trust for Public Land, St Johns Riverfront Property

		Analysis Requested [a]											
Sample ID	Collector	Hydro-carbon Scan (8015M)	Oil and Grease	TOX	BTEX	VOC (8260)	SVOC (8270)	PCBs (8080)	PCP (8150A Mod.)	PCBs (8080)	PAHs (8310)	Priority Pollutant Metals [b]	Archived [c]
Area 1: Portland Manufacturing Co. (Plylock Corp), Plywood Mill													
Test Pits													
TP-1	[redacted]												X
TP-2	[redacted]					X							
TP-3	[redacted]					X				X		X	
TP-4	[redacted]												X
A1C1	[redacted]	X					X						
A1C2	[redacted]									X		X	
Test Borings													
SE/E-10-25	SE/E		X	X				X					
SE/E-11-15	SE/E		X	X				X					
SE/E-12-A [d]	SE/E							X					
SE/E-12-15	SE/E		X	X				X					
SE/E-12-B [d]	SE/E							X					
SE/E-13-A [d]	SE/E							X					
SE/E-13-10	SE/E		X	X				X					
SE/E-13-B [d]	SE/E							X					
SE/E-14	SE/E							X					
SE/E-16-10	SE/E	X			X			X					
SE/E-19-30	SE/E	X			X			X					
TB-1-15S	[redacted]					X							
TB-1-SC1	[redacted]							X					
Area 2: Port of Portland, Dry Dock and Shops													
Test Pits													
TP-6	[redacted]												X
TP-7	[redacted]									X			
TP-7A	[redacted]												X
TP-8	[redacted]												X
TP-9	[redacted]					X							
TP-9A	[redacted]												X
TP-10	[redacted]												X
A2C1	[redacted]	X									X		
A2C2	[redacted]											X	
A2C3	[redacted]											X	
A2C4	[redacted]									X			
Test Borings													
SE/E-7-10	SE/E		X	X				X					
SE/E-8-20	SE/E		X	X				X					
SE/E-9-15	SE/E		X	X				X					
SE/E-15-20	SE/E	X			X			X					
TB-2-15S	[redacted]					X							
TB-2-SC1	[redacted]									X			X

Table 5-2

Summary of Soil Samples Collected and Laboratory Analysis
Trust for Public Land, St Johns Riverfront Property

		Analysis Requested [a]											
Sample ID	Collector	Hydro-carbon Scan (8015M)	Oil and Grease	TOX	BTEX	VOC (8260)	SVOC (8270)	PCBs (8080)	PCP (8150A Mod.)	PCBs (8080)	PAHs (8310)	Priority Pollutant Metals [b]	Archived [c]
Area 3: Western Cooperage													
Surface Soil Samples													
Test Pits													
TP-11	[redacted]					X							
TP-12	[redacted]												X
TP-13	[redacted]												X
TP-14	[redacted]												X
TP-15	[redacted]								X				
A3C1	[redacted]	X					X			X			
A3C2	[redacted]										X		
A3C3	[redacted]										X		
A3C4	[redacted]								X				
Hand-Augered Borings													
HA-1			X	X				X					
HA-2			X	X				X					
HA-3			X	X				X					
HA-4			X	X				X					
Test Borings													
SE/E-1-10	SE/E		X	X				X					
SE/E-2-10	SE/E		X	X				X					
SE/E-3-10	SE/E		X	X				X					
SE/E-4-20	SE/E		X	X				X					
SE/E-5-10	SE/E		X	X				X					
SE/E-6-20	SE/E		X	X				X					
SE/E-17													
TB-4-15S	[redacted]					X							
TB-4-SC1	[redacted]								X		X		
TB-3-SC1	[redacted]								X	X	X		
Willamette River Sediments													
Sediment Samples													
A1-SD-1	[redacted]	X				X	X		X	X	X	X	
A2-SD-2	[redacted]	X				X	X		X	X	X	X	
A3-SD-3	[redacted]	X				X	X		X	X	X	X	

NOTE: [redacted]

[a] Represents USEPA method number. E.G. (8260) is USEPA Method 8260 for volatile organic compounds using gas chromatography and mass spectral analysis.

[b] Priority pollutant metals: Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Tl, Zn.

[c] Archived samples were submitted to CAS for holding without requesting analysis.

[d] Composite soil sample.

Table 5-8

Summary of PAHs Detected in Sediment Samples
(ug/Kg)
Trust for Public Land, St Johns Riverfront Property

Analyte	MRL	Sample Identification		
		A1-SD-1[a]	A2-SD-2[a]	A3-SD-3[a]
Napththalene	0.1	,0.5	<0.3	<0.3
Acenapthylene	0.1	,0.5	<0.3	<0.3
Acenaphthene	0.1	,0.5	<0.3	<0.3
Fluorene	0.02	<0.1	<0.06	0.09
Phenanthrene	0.01	1.4	0.14	0.21
Anthracene	0.01	0.18	0.03	0.06
Fluoranthene	0.02	2	0.23	0.37
Pyrene	0.02	2.7[b]	0.2	0.35
Benz(a)anthracene	0.01	1.5	0.09	0.15
Chrysene	0.01	2.9[b]	0.13	0.21
Benzo(b)fluroanthene	0.02	1.3	0.11	0.18
Benzo(k)fluroanthene	0.01	0.67	0.05	0.08
Benzo(a)pyrene	0.01	1.9	0.1	0.15
Dibenzo(a,h)anthracene	0.01	<0.2[c]	<0.03	<0.3
Benzo(g,h,i)perylene	0.02	1.6	0.1	0.11
Indeno(1,2,3-cd)pyrene	0.01	0.98	0.05	0.06

Note:
MRL = method reporting limit.
a = MRLs are elevated because of the low percent solids in the sample as recieved.
b = Result is from the analysis of a diluted sampled, performed on 11/2/95. Dilution factor: 50.
c = MRL is elevated because of matrix interferences and because the sample required diluting. Dilution Factore:5.

Table 5-9

Summary of Metals Detected in Sediment Samples (mg/Kg)
Trust for Public Land, St Johns Riverfront Property

Analyte	MRL	Sample Identification		
		A1-SD-1[a]	A2-SD-2[a]	A3-SD-3[a]
Antimony	10	ND	ND	ND
Arsenic	1	4	4	4
Berllium	1	ND	ND	ND
Cadmium	1	ND	ND	ND
Chromium	2	18	33	33
Copper	2	26	60	84
Lead	20	24	28	53
Mercury	0.2	ND	ND	0.2
Nickel	10	20	23	23
Selenium	1	ND	ND	ND
Silver	2	ND	ND	ND
Thallium	1	ND	ND	ND
Zinc	2	103	131	178

Note:
MRL = method reporting limit
ND = not detected above the MRL

EXPLORATORY TEST PIT LOG

PROJECT NAME TPL
LOCATION St. Johns
DUG BY Stratus, Inc.
METHOD Backhoe
LOGGED BY Nikki Free

TEST PIT NO. TP-2
PAGE 1/1
GROUND ELEV.
TOTAL DEPTH 4.0
DATE COMPLETED 10/20/15

Sample # (Train)	Sample Depth (ft)	FID (ppm)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
TP-2 (115)	0-4.0	0		5 10 15 20			0-4ft: sandy gravelly silt, brown (various shades) compact; damp; common asphalt debris, some concrete and ceramic, fine to course gravel (FILL) few plastic, wood

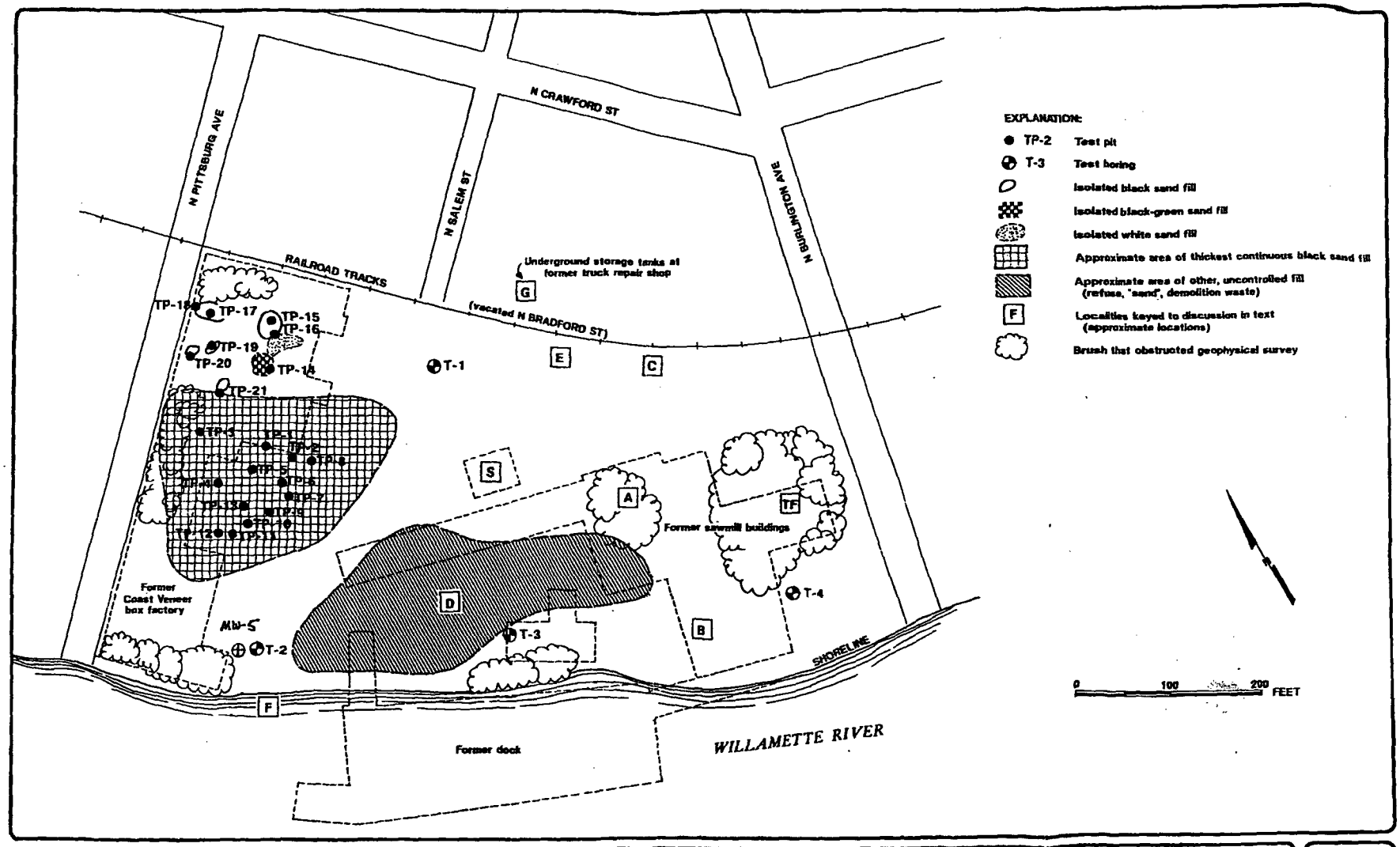
REMARKS

.....SEELTP

Appendix G

APPENDIX G

FIGURE 2 FROM JULY 20, 1989 SWEET-EDWARDS/EMCON REPORT



Sweet-Edwards EMCON

PDC PROPERTY
PORTLAND, OREGON
Site Map

Figure 2

DATE 7/89
DWN.
APPR.
REVIS.
PROJECT NO. T2403.01